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Don't Hum It—"Tra-la-la"

But learn the Words and sing with all your might!

THE STAR SPANGLED BANNER.

Oh! say, can you see by the dawn's early light,
What so proudly we hailed at the twilight's last gleaming,
Whose broad stripes and bright stars thro' the perilous fight,
O'er the ramparts we watched, were so gallantly streaming;
And the rocket's red glare, the bombs bursting in air,
Gave proof thro' the night that our flag was still there.

CHORUS

Oh! say, does that star spangled banner yet wave
O'er the land of the free and the home of the brave!

On the shore dimly seen thro' the mist of the deep,
Where the foe's haughty host in dread silence reposes,
What is that which the breeze, o'er the towering steep,
As it fitfully blows, half conceals, half discloses?
Now it catches the gleam of the morning's first beam,
In full glory reflected now shines in the stream;

And where is that band who so vauntingly swore,
'Mid the havoc of war and the battle's confusion,
A home and a country they'd leave us no more!
Their blood has washed out their foul footstep's pollution;
No refuge could save the hirelings and slave
From the terror of flight or the gloom of the grave.

Oh! thus be it ever, when freemen shall stand,
Between their loved homes and the war's desolation,
Blest with vict'ry and peace, may the heaven rescued land
Praise the power that hath made and preserved us a nation.
Then conquer we must, for our cause it is just,
And this be our motto, "In God is our trust."

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Original Communications.

CAVITY PREPARATION FOR GOLD FOIL, GOLD INLAY AND AMALGAM OPERATIONS.

By Walden I. Ferrier, Burlington, Wash.

(Read before the National Dental Association at Its Twentieth Annual Session, Louisville, Ky., July 25-28, 1916.)

A FEW years ago while looking over some magazines, a sentence on a cover page so impressed me by its aptness and truth that I have never forgotten it. The sentence is as follows: "What the world needs is not so much new knowledge as to be reminded of what it already knows." And it was with this in mind that I accepted an invitation to present a paper on what might seem to be a worn out subject.

However trite and seemingly worn the subject, there is probably no other cause, so prolific of failure in our operations of restoring lost tooth structure, as that of faulty cavity preparation, and the only help I can see at present for this state of affairs is by repeated demonstrations of the principles of correct cavity preparation, which have so long been scientifically established.

May I add here my belief that one of the many splendid characteristics of that "grand old man" in dentistry, the late Dr. G. V. Black, was his unswerving interest and patience in the teaching and dissemination of these principles long since proved to be correct.

It would be difficult indeed, at this time, to find in the dental world any who are not willing to accept and acknowledge the correctness of these principles. And yet, how few appear to make use of this knowledge in their work at the chair from day to day.

The operation of preparing a cavity in

a tooth is not a simple one,—every day we are having forced upon us the responsibility of the dentist, as guardian of the health of the people; and cavity preparation is a very important link in the chain of our obligation to humanity. If there is one place in the world where the phrase, "a chain is not stronger than its weakest link," should be printed in type that never dims, that place is in front of the dental chair.

There is a mixture of art, science and mechanics necessary in the correct preparation of a cavity in a tooth that stamps it as an achievement of no ordinary character. Few men are to the manner born and it is only by means of years of earnest study and endeavor, that the majority of us attain proficiency that is commendable. The great difficulty is in stirring up in dentists generally an ambition to attain this proficiency. We all know it is the rarest thing in our practice to find teeth in which operations have been made, in any appreciable per cent of which, cavity preparation has been carried out in detail, consistent with well known scientifically proved principles.

Out west we have been engaged in study club work for a number of years and a more enthusiastic grateful crowd you have never met; enthusiasm for the future of dentistry, grateful to those who have spurred us on and because we have attained some degree of success. As I recall the organization of that first study club in Seattle some years ago, it is with a feeling of amusement. Of course we were dentists (?), our desire to study and improve even led us to believe we were good conscientious dentists—did not our college say we were dentists?—the great commonwealth of Washington said we were dentists—even some of our patients said we were dentists and if asked we would probably have admitted ourselves that we were dentists; but ladies and gentlemen, that first year's work so impressed us with our inefficiency that each and every one was willing to admit that someone had been "kidding."

A friend of mine told me that in conversation with Dr. G. V. Black, some years ago, Dr. Black made the statement that the great need of the dental profession was the scientific mind. If we as a profession could get hold of this idea I wonder if it would not stir us to renewed activity and enthusiasm for some of the subjects we think are old fashioned, and a lack of interest in which helps to swell the grand total of inefficiency and unhappiness in this old world of ours. Would not some of our offices be brighter with a new found joy in our work, because of the help we might be to those who trusted themselves to our care?

By the phrase "preparation of cavities" according to Black is meant such a mechanical treatment of the injuries to the teeth produced by dental caries as will best fit the remaining part of the tooth to receive a filling, restoring the original form, give it strength and prevent recurrence of decay in the same surface. That we may have a definite order of procedure he has divided cavities into five different classes, in each of which the cavities require similar treatment and instrumentation, namely:

Class one—Cavities beginning in structural defects in the teeth-pits and fissures.

Class two—Cavities in the proximal surfaces of the bicuspids and molars.

Class three—Cavities in the proximal surfaces of incisors and cuspids which do not involve the removal and restoration of the incisal angle.

Class four—Cavities in the proximal surfaces of incisors and cusps which do require the removal and restoration of the incisal angle.

Class five—Cavities in the gingival—third—not pit cavities—of the labial buccal or lingual surfaces of the teeth.

We will proceed to prepare cavities for each of the different classes, having in mind gold foil as the filling material, later giving such modification as is necessary when either gold inlays or amalgam is used. The procedure in preparing

cavities consists of obtaining the outline form, resistance form, retention form, convenience form, the removal of the remaining carious dentine, the finishing of the enamel wall and the making the toilet of the cavity.

Let us take for example the preparation of a cavity in the occlusal surface of the lower first molar. The tooth itself and the adjacent teeth are scaled, and the gums wiped carefully with a pledget of cotton, saturated with alcohol preliminary to placing the rubber dam. And here let me state my firm opinion that it is not possible to properly prepare a cavity without first isolating the tooth with the rubber dam. It seems to be the opinion of many operators that it expedites matters to dispense with the use of this valuable assistant. How frequently do we hear the assertion "the patient is gagged and made extremely uncomfortable by the use of the infernal dam." Carefully kept records in my own practice show that the average time consumed in placing the dam for all filling operations is less than five minutes. Patients are not gagged so far as I have observed and the use of an efficient saliva ejector, eliminates much of the discomfort. Furthermore, the rubber is a protection to the lips and cheeks, illuminates the cavity, excludes moisture, eliminates all unnecessary conversation which is no small factor in consuming time and really reduces the time of operating at least one-third. This is assuming that the same detail is carried out in the cavity preparation if such execution of detail were possible.

A number twenty-seven S. S. W. clamp is placed upon the second molar and all the teeth isolated by the rubber dam up to the central incisor, a small round bur is placed in the grove that seems to offer the least resistance to its penetration and by swaying motion and gentle pressure the bur soon enters the dentine A larger round bur is selected and by the same procedure the opening is enlarged. This is the only use we have for the round bur in preparing the cavity. Noteworthy in passing, the manufacturers inform us that the round bur is by far the most popular, and an examination of most of the operations that come under our observation seems to substantiate this claim. If the decay is somewhat extensive the overhanging enamel may be readily chipped away with a Black bi-angle chisel, 15-8-12 enamel hatchets or a small, Wedelstaedt chisel—personally I prefer the latter two mentioned. If the decay is incipient, an inverted cone bur is pressed against the axial walls of the cavity and the enamel undermined to such an extent that it can be readily chipped away.

This undermining and chipping is continued until the desired outline form is obtained. In such a cavity this should be only enough to obliterate all the grooves and so place the margins that the operation may be easily and smoothly finished. Extension for prevention does not apply to this class of cavity. They occur on self-cleansing areas and would be immune were it not for the structural defects in the enamel. Resistance and retention form are obtained by placing the square end of an inverted cone bur against the pulpal wall and carrying it entirely around the cavity. The pulpal wall is made flat and the pulpo-axial line-angle made sharp and definite; the axial walls are made perpendicular and at a right angle to the pulpal walls by the use of 15-8-12 Enamel hatchets. Here is where most error enters in the preparation of this class of cavities. Instead of having the pulpal wall meet the axial walls at right angles the two walls present a continuous concave surface, retention being obtained by tunneling and grooving some other portion of the cavity. Foil cannot be made to wedge in such a cavity and prevent leakage. Inlays have not the proper retention and amalgam has a tendency to spheroid. No convenience form is necessary in such a cavity, if any decay remains it can readily be removed

with the spoons, 10-6-12. The enamel wall may be prepared by planing with a sharp chisel, the line of force being in the direction of the length of the margin. The inclination of the enamel rods is toward the cavity and need no outward bevel. The cavo-surface angle is slightly beveled to prevent fracture of the enamel rods in placing the filling, but requires none in amalgam and inlay operations. The toilet of the cavity is made by the use of the chip-blower and dry cotton in the foil carriers. We have no use for alcohol or other medicaments in a clean freshly prepared cavity.

Class two cavities illustrate the meaning of extension for prevention. Beginning caries in the mesial surface of an upper first molar will serve our purpose well. Probably the best way to open up such a cavity is by introducing a bi-bevel drill in the central occusal pit and advancing it to the dento-enamel junction. This is followed by a small inverted cone bur, the force being applied mesially and the instrument drawn occlusally, and repeated until a groove is cut thru the mesial marginal ridge. The bi-bevel drill may now be used again to unite the occlusal step with the cavity of decay. A number 558 cross cut fissure-bur with the force applied buccally and lingually followed by a sharp chisel to break down the enamel will so open up the cavity that a general survey may be made, and the required extension decided upon. It is well to go back to the occlusal step and finish its outline form. It is imperative that an occusal step be made in this class of cavity in order that the proper resistance and retention form be obtained. Practically the same instrumentation is used as in the preparation of the Class One cavity, just described. The mesio-occusal angle should be well rounded so that the recessional line of the pulp cornu at this point be not exposed, resulting in its death and the demand for its subsequent removal.

We may now give our attention to the preparation of the outline form of the proximal portion of the cavity. The number 558 cross-cut fissure-bur is used to extend the buccal and lingual walls to such a point that their cavo-surface angles when finished will lie in self-cleansing areas. Here is where the preparation for a gold foil or amalgam operation varies markedly from an inlay operation. The occusal outline of the tooth—not the cavity—we are operating upon presents the form of a rhomboid, the mesio lingual angle being obtuse, the mesio-lingual cusp is somewhat rounded toward the occusal and the lingual cusp of the second bicuspid is decidedly curved at the disto-lingual angle. The arrangement of these two teeth therefore is such that the embrasure opens occlusally as well as lingually, requiring less extension bucco-lingually in the occusal third of the cavity than in the gingival third, resulting in the buccal and lingual walls, more decidedly the lingual, meeting the gingival wall at an acute angle rather than at a right angle. Considerable tooth structure is saved by such a preparation and the principle of extension for prevention is as well served as if the buccal and lingual walls were parallel as they must necessarily be in an inlay preparation. The mesial surface of an upper first molar is taken as an example of this form of cavity preparation, but the principle is applicable to most cavities of this class.

The retention and resistance forms are obtained principally in the step, by the same means used in Class One preparations, the axial walls are made to meet the pulpal walls at a right angle, the axial wall of the proximal portion of the cavity is slightly curved, its concavity presenting toward the pulp and meeting the gingival, buccal and lingual walls at definite and sharp angles. The bucco-gingivo-axial and linguo-gingivo-axial angles are made especially sharp by use of the smallest size inverted cone bur and number 6 hoe, as a convenience and retentive measure in placing the gold. A cavity so prepared needs no further con-

venience form, the paralleling of the buccal and lingual wall of the proximal portion would possibly be an added, but in most cases an unnecessary convenience. The remaining carious dentine may be removed with the spoons, 20-9-12. The enamel walls are now planed to form. On the occusal step they are treated as in Class One preparations. In the proximal portion they are inclined to the buccal and lingual, the degree of inclination being governed by the enamel cleavage. The gingival enamel wall is inclined slightly toward the gingival. The cavo-surface angle is beveled with a chisel, followed by Dr. Searl's enamel planes, in all portions of the cavity outline, except the gingival. Here the gingival margin trimmers 20-(80)-9-12 right and left are used with a scraping motion to give the proper bevel and round out the bucco and linguo-gingival angles. The cavity toilet is now made when the tooth is ready to receive the filling material.

Class Three cavities in the proximal surfaces of incisors and cuspids which do not require the removal and restoration of the incisal angle present some difficulty in their retention, convenience and resistance form, due to the fact that these surfaces are triangular in shape, the apex of the triangle ending between two closely approximating walls of enamel. With a hoe 8-3-6 used as a chisel begin the preparation by chipping away the enamel from the labial margin. The smallest size inverted cone bur is now introduced and carried to such a point gingivally that the gingival margin will be covered with gum tissue when finished; the bur is moved from labial to lingual until the gingival outline is established. This outline form is not a straight line at right angles to the long axis of the tooth as is generally supposed, but presents the form of a curve, convex toward the incisal angle, the degree of curvature depending upon the outline of the free gingiva. This places the labio-gingival and linguo-gingival angles under the gum. The cavity is extended incisally thru the contact point and to such a position that this angle may be readily finished and free from contact with the approximating tooth when the filling has been placed. The labial wall is extended to such a point that the finished operation will reflect the light and not appear as a dark line between the two teeth. A small chisel is used to make this line parallel with the developmental grooves, the extent of its gingival and middle thirds,—when it is curved rather abruptly to the point decided upon as the incisal angle of the cavity. Such a preparation gives us better access to this angle and renders its filling more convenient from the labial aspect. The lingual outline is placed on the lingual surface of the tooth where it may be kept clean by the movements of the tongue. In establishing this outline due regard must be had for convenience in placing the filling, especially at the linguo-gingival angle where most failures in this class of operations occur. The axial wall is made flat or slightly curved around the pulp with the hoe 6-2-23. The gingival wall is made at right angle to this wall with the Woodbury-Crandall hoes 7-85-2-6 and 12-85-5-6 right and left, resulting in a sharp and definite axio-gingival angle. The axio-labial angle is established with the hatchet 5-3-28 and the axio-lingual angle with the hoe 6-2-23.

Special resistance form is not required beyond the retention form in these cavities. The retention form is made by slightly undercutting the incisal angle with the hoe 6-2-23, giving the cavity a general triangular box-like form, special attention being given to the labio-gingivo-axial and linguo-gingivo-axial point angles. Convenience pits may be cut in these two angles, but usually all they require is to be made sharp and definite. The Perry separator is used as an added convenience in placing the gold and finishing the operation. The enamel walls should follow the line of cleavage of the enamel and be made

smooth by the use of a chisel and Searl's enamel planes. A slight cavo-surface bevel should be given to the wall thruout and the toilet of the cavity made.

Class Four cavities occur on the proximal surfaces of the incisors which require the removal and restoration of the incisal angle. Various means of operating in these cavities have been advanced by a number of writers, but the "L" filling or Johnson step is undoubtedly the operation of choice in the vast majority of cases. It is as necessary to the proper resistance and retention form to secure the operation with an incisal step in this class of cavity as in the proximo-occlusal operation of bicuspids and molars. It requires a painstaking effort and a high degree of skill to properly place proximo incisal operations, but the results fully justify the means. The principal argument advanced against such an operation is the conspicuous display of gold necessary in its completion. If, however, the outline form of the cavity is in complete harmony with the size and shape of the tooth, its appearance is at least not any more displeasing than an angle restoration without the incisal step.

The outline form is started by cutting away the angle with a sharp chisel, the incisal two-thirds of the tooth is cut gingivally with a stone to such a point that will bring the step to a pleasing proportion with the proximal part of the cavity and give a good base of dentin for resistance. The proximal part of the cavity is prepared as in Class Four operations, minus the incisal angle. With the smallest size inverted cone bur, sunk to the depth of its head, a groove is cut between the labial and lingual enamel plates, to the extent of the outline form given by the stone. The lingual enamel plate is now chipped away to the bottom of the groove, as a rule, governed of course, by the labio-lingual diameter of the incisal third of the tooth. The inverted cone bur is again started as before and the groove deepened keeping toward the lingual surface so as to leave the labial and lingual walls supported by dentin. The enamel walls are now so treated that no short rods are left remaining, and it is here that this preparation is generally neglected. The enamel rods run diagonally from the labial and lingual cavo-surface angles to the center of the groove just cut and their line of cleavage must be particularly noted. A step so prepared will be flaring from the pulpal wall incisally, permitting a much larger mass of gold at this otherwise weak position and reducing to a minimum the amount of enamel the gold has to rest upon. The proximal incisal angle is rounded very slightly, both on the labial and lingual plates. The cavo-surface angles are beveled a trifle and altho many operators disagree, I believe a fine cuttle fish disk is best suited for this purpose. The toilet of the cavity is made and the tooth is ready to receive the filling. An operation so made with care and skill has as good a chance for lasting success as any operation in any tooth.

In connection with this class of cavity I want to speak of a special preparation for cavities of decay occurring in the distal surface of the upper left cuspid. For a right handed operator the distal surface of an upper left cuspid presents unusual difficulties of access. By converting the Class Four preparation into the Class Five preparation just described, the operation is practically as convenient as in an incisor. The shape of a cuspid, thick at the incisal angle, leads itself nicely to such a preparation, the middle lobe of the tooth effectually concealing the incisal step when viewed from any angle except a right angle to the tooth. This cavity preparation was first described by Dr. E. K. Wedelstaedt, of St. Paul, and taught to his study clubs. This type of preparation has been used by the writer for every cavity in the distal surface of the upper left cuspid that has presented in the past four years, and has given entire satisfaction.

Class Five—cavities in the gingival third—not pit cavities—in the buccal-labial or lingual surfaces of the teeth. These smooth surface cavities occur so rarely on the lingual surfaces that a detailed description of their preparation would not be within the province of this paper, nor will time permit more than a superficial description at all; the cavity outline must be placed well under the free margin of the gum gingivally and include all the affected enamel in all directions. Extension for prevention consists of placing the mesial and distal wall at the mesio-buccal or labial and disto-buccal or labial angles. Decay will rarely recur if intelligent cooperation of the patient is observed and the operation well placed.

Of cavity preparation for amalgam operations little need to be added to the foregoing. The same preparation will answer as well for gold foil as for amalgam. However, it is probably a better procedure to have no short cavo-surface bevel, but rather bevel the entire enamel wall, thereby leaving no thin edge of amalgam to chip away by the force of mastication.

For inlays we also have little to add. The walls must be parallel to permit of the removal of the wax, but not diverging to any appreciable extent. Tapered burs and stones have no place in the ordinary cavity preparation in bicuspids and molars. The ideal inlay preparation would be absolutely parallel walls meeting flat bases at right angles, and we should approach it as closely as possible. Sharp and definite angles are essential, not only in the proper retention of the finished inlay but to the true wax pattern itself in the making. A cavo-surface bevel is not needed in the step portion of Class Two cavities, as we use no instruments to mar the margins in placing the operations. Should a discrepancy occur at the gingival margin it can frequently be rectified by grinding the pulpal surface of the inlay, allowing it to seat itself further gingivally in the cavity, and the cavo-surface bevel of the margins of the step would prevent this procedure. Gold inlays are so rarely indicated in the anterior teeth that a description of cavity preparations will be omitted.

The necessity for more careful and painstaking effort on the part of the vast majority of the profession in the preparation of cavities for filling operations is evident. The dental profession has made rapid strides in the past few years in the prevention of dental disorders by prophylaxis. School children are being taught oral hygiene by competent self-sacrificing men the world over, and the results are becoming evident, but the bulk of the work of the general practitioner has been in the past and will be for many future years, the restoration of lost tooth structure and lost function of the teeth by operations made within the structure itself.

Discussions.

Dr. W. H. O. McGeehee, Cincinnati, Ohio.

It has been a great pleasure to listen to the excellent presentation of this subject by Dr. Farrier. I have enjoyed every bit of it. The subject is indeed a well-worn one, as said by the essayist, but at the same time my experience has been that it is always a very interesting one to the average dental audience. In former years, when I was called upon to read a paper on the subject of Cavity Preparation, I felt like offering an apology to the audience for traversing this well-known ground, but later, after having been thru the subject at different meetings, I felt that the work which I had put upon my paper was fully justified in the results which were obtained.

It seems to me that this subject of cavity preparation might almost be called the key-note of successful dental practice today, owing to the fact that the lasting qualities of our filling materials will depend largely on the proper preparation of the foundation upon which they are to rest. It makes no difference of what material the filling is composed, it makes no difference how well it is

shaped, if the cavity is not prepared along scientific lines the filling will be only a temporary expedient. That being the case, I feel that repeated demonstrations and repeated talks on this subject are extremely important.

Cavity preparation was a good many years ago placed on a definite scientific basis by Dr. G. V. Black and his coworkers. Black cavity preparation is being taught in practically all dental colleges of any repute in this country, and is the only form of cavity preparation which is described in any modern textbook on operative dentistry. That being the case, the average dentist is at least familiar with the principles of this form of cavity preparation, yet at the same time we will have to admit, with the essayist, that altho the profession as a whole may be familiar with the theories of cavity preparation, they are certainly not putting these theories into practice in the daily routine at the chair.

The essayist brought out the point that Dr. Black mentioned some time ago the great need in dentistry for the scientific mind. That is just as applicable to cavity preparation as to any other subject in the entire realm of dentistry. Cavity preparation, as I have stated, was placed on a definite scientific basis, and exact, definite rules have been laid down for its performance. All science is exact, else it cannot be called science at all. The forms which have been defined by the essayist are of course ideal forms, and the forms which are illustrated in the text-books, according to my way of thinking of the matter, are simply ideal forms toward which the operator must attempt to work. At the same time there are certain modifying factors, such as the shape of the teeth, age, physical and mental condition of the patient, and other environmental influences which have to be taken into consideration when we attempt to approach these ideal forms. That being the case, we cannot always prepare cavities according to the ideal forms but we should, depending upon the conditions under which we are working, attempt to approach them as closely as possible. These ideal forms, it seems to me, offer us a definite working basis, an idealistic premise from which we may argue and proceed to a logical conclusion in our work of cavity preparation. In conversation with a noted educator several months ago he made the statement that you cannot measure up all cavities with a yard stick. I agree with him in that statement to the extent that you cannot always obtain those ideal forms which have been described in the excellent presentation of the essayist. At the same time I feel that, if we are going to have scientific cavity preparation, we must try to get down to exact and definite lines in the preparation of these cavities in the teeth upon which we are working and altho we may not be justified in using a yard-stick, I firmly believe that if we have the scientific mind, if we will try to build on a millimeter gauge instead of going at it haphazard, we will get much better results.

The essayist has mentioned the various steps in cavity preparation. It is important that the operator keep these five steps separate in his mind, altho there is frequently an overlapping of the various steps. Yet if we will try as far as possible to complete one step and make it as perfect as possible before proceeding to the next, in that way we will accomplish much more perfect results in the completion of the cavity.

It seems to me that this question of cavity preparation is an exceedingly serious matter. In fact, if one's ethical faculties, one's higher moral attributes are developed to the fullest extent it will be looked upon in the light of a ceremony—a ceremony almost as serious as that incident to the performance of a religious rite. I believe we ought to assume that attitude in regard to it, not only this morning in this room, but forever afterwards, if we want to get the best results in our work.

I agree with the essayist that as a rou-

tine measure the rubber dam should be applied. At the same time, I feel there are certain cavities of a simple nature in which we are justified in dispensing with the rubber dam. I believe the saliva should be excluded from the cavity thruout the preparation if we expect to get good results, but at the same time I feel there are cases in which the rubber dam may be dispensed with. That being the case, I would not say a cavity cannot be successfully and perfectly prepared without the use of the rubber dam.

In regard to the mesio-occlusal cavity in the upper first molar, I desire to take issue to some extent with Dr. Ferrier's statements in that connection. One point the doctor brought out was the fact that he did not believe it absolutely necessary to parallel the buccal and lingual walls in cavities of this class, owing to the shape of the teeth on which we are working. I believe that if the buccal and lingual walls are made parallel, we will have much better access to the field of operation. In addition, the filling material will be much more readily adapted against the buccal and lingual walls if they are absolutely parallel instead of being allowed to approach each other as the occlusal surface of the tooth is reached.

The essayist made the statement that the principal resistance is obtained at the top of the step. This statement should be modified, for I believe that if the gingival wall be properly prepared, if the seat for the filling be made sufficiently broad in a mesio-distal direction and carried bucco-lingually to a sufficient extent, the greatest amount of resistance would be and should be obtained from the gingival wall instead of at the top of the step.

In regard to proximal cavities on anterior teeth, the essayist makes the statement that the gingival wall instead of being a flat wall or plane surface, should rather be allowed to follow the curvature of the gingival line, with the result that it will be more or less of a convex surface with its convexity pointing toward the incisal angle of the cavity. In the preparation of cavities on the anterior teeth it is very rarely the case that I prepare the gingival wall in any other manner except an absolutely flat wall. About the only exception to that general rule, as laid down by G. V. Black, it seems to me, is the preparation of cavities of this class in the lateral. That is an exceedingly delicate tooth and I have some times felt justified in producing a convex gingival wall in this case, in order to secure a larger seat on that wall. With the exception of very small anterior teeth, however, it is good practice to make this wall absolutely flat.

Another point in regard to proximal cavities on anterior teeth is, that if the gingival walls are curved they will be so close that the gingivo-axial point angles would be placed under the gum. I think the gingival wall should rather be made flat, as I have stated, and that it should extend toward the labial or lingual surface, in order that the angles may be placed in immune areas instead of under the gum tissue.

In regard to this gingival wall I have in mind a piece of Biblical lore, which I am sure you will recall, in regard to a certain man who built his house upon the sands of the seashore. But it did not stand very long, owing to the fact that it was built on an insecure foundation. Another man built his house on a rock, and the waves beat against it, the storms came and the winds blew, but they could not prevail against it, because the house was founded upon a rock. And gentlemen, I desire to tell you this morning that my firm belief is that, instead of being concave or convex, that rock was absolutely flat—that rock on which he built his house. You realize that the stress during mastication is very great, averaging from 75 to 175 pounds. In many instances owing to contact with foreign substances, such as oyster shell or a small piece of bone or something of that character, this stress

is largely increased, sometimes to 250 or 300 pounds. It seems to me you can see at a glance the importance of having a flat seat for your filling in order that the stress may be resisted to the utmost.

The doctor made a statement in regard to proximal cavities in anterior teeth, saying that the incisal angle of the cavity under all circumstances, as I understand, should be extended beyond the contact point. That of course is the ideal condition, if it can be obtained. We will have to admit, however, owing to the shape of the anterior teeth, in many instances the contact point is very frequently close to the incisal angle. In these cases then, I think it would be much better, instead of extending the cavity thru to include the contact point, to resort to adequate separation and obtain a new contact point established on the filling itself.

In regard to the incisal step for cavities in anterior teeth, I agree with Dr. Ferrier that, with the proper incisal step, the form is ideal. I believe, however, that in many cases of lateral incisors the lingual step form will answer the purpose as well or better and will avoid the necessity of a great display of gold. This also holds true with reference to cuspid teeth. I do not believe it is necessary to remove a great deal of labial enamel in the preparation of forms in incisal cavities. In a majority of cases the labial enamel plate may be preserved, owing to the fact that the tooth has sufficient thickness in the labio-lingual direction to admit of its preparation in that manner.

Whenever I read a paper on cavity preparation with illustrations, either models or slides, after the lecture is over I frequently hear some one say, "Doctor, it is all very well to show us these beautifully prepared cavities in plaster forms, but under the conditions as we find them at the chair it would be impossible, almost, to obtain these ideal forms." Whenever I hear a man talk that way I immediately set him down as a careless, slipshod operator. It is possible to obtain these forms in the mouth, not only possible, but really important that they should be obtained. And they can be obtained if you know how to do it and work; but you must use the right kind of instruments and take the necessary time to accomplish results.

I have in mind a certain furniture manufacturing concern in Cincinnati. As you probably know, Cincinnati is a great market for furniture. This firm manufactures what they call "saw-test" furniture. Years ago they concluded that if they wished to make a lasting success it would be necessary for them to place furniture on the market which would not only present a highly finished surface, but the details of the structure of which would stand inspection. Their advertisements show a library table, book-case or some similar article being sawed thru with a saw of heroic dimensions and underneath, this legend:

"If you saw it thru
'Twould prove it true,"

a quotation from the Bard of Avon, and following that is another statement, "What you cannot see, we will vouch for."

In conclusion, Mr. Chairman, I wish to leave this thought with you—that if we, as dentists, desire to make a lasting success, we must have uppermost in our minds the idea of service, and we must make our operations, not only our cavity preparation operations, but our filling operations and all routine work incident thereto, so that they will stand the "saw-test." I thank you very much.

DR. JOHN STEELE, Denver, Colorado: I have enjoyed this paper very much; I had the privilege of reading it before the meeting. I have also enjoyed the discussion. Many of the points in the paper I think would be of great value to all of us—in fact, I intend to preserve the paper and make use of it. It is a concise paper, one that we can refer to in our busy moments and make use of many of the points.

A new point was the preparation of cuspids, where the doctor spoke of stepping them. To me that sounds like a new idea, and I like it very much. There are some points where I do not just agree with him, for instance not using any medicine at all in your cavities. Really, I cannot see any harm in using a simple medicament sometimes. I always use some remedy, not that it is always required, but it does no harm and often makes the preparation easier on the patient.

Yesterday at the morning session Dr. Price took exception to the word "perfect." I would like to take exception to the word "scientific," which is used so much in speaking of dentistry. We call our work "scientific," the preparation of cavities, "scientific." Dr. Black, I have no doubt, prepared some of these cavity models along scientific lines, but cavities in teeth are different. If you are going to do anything scientific you will have to have the same scientific procedure for every tooth. As a matter of fact, we are not scientific. We use our eye when we make our measurements; we measure by our eye when we are preparing a cavity, and we guess at the strength of walls and margins. We have before us a good outline, the idea of a perfect cavity, but we cannot say that there is anything scientific in our precedure when we make no tests or measurements. I believe that dentistry is not an exact science at all. I see very little of our work that I would call scientific. It is mighty good, but I believe most of our work is done by having a good eye and measuring as well, as possible, and that dentistry is rather more artistic than scientific.

There is one point I want to take exception to, and that is where the essayist speaks of inlays, that in order to get a better fitting inlay at the gingival line the face of the inlay may be trimmed. I take exception to that. If your inlay does not fit—it is supposed to be as exact as you can make it—but if it does not fit you cannot make it fit by grinding the face. Of course if there are bubbles it is all right to remove them, but if it does not fit—you had better make a new one.

I think this is a splendid paper. And I will be glad to take it home and study it more. I think this club in Washington has done a great deal of good and it is a lesson to us all. They started thinking they were proficient, and found out how very little they knew about the work. I think that is the right way to start. I thank Dr. Ferrier very much, and also Dr. McGeehee for his discussion.

DR. JOHN M. TEMPLES, Tulsa, Oklahoma: I rise to express my appreciation of the essayist's effort. I certainly was impressed with one point he makes, and that is the putting on of a rubber dam—the time saved by doing this. I am quite sure the average practitioner does not use the rubber dam as often as he should, but to me the saving of one-third of my time by using the rubber dam is certainly worthy of consideration. I had not counted up how much time I saved, but I am sure he must be correct.

I appreciate the paper very much, but not being a college man I am not prepared at this time to take issue on anything, and I am sure I cannot add to what the doctor has said. I take this opportunity to thank both the gentlemen for their valuable contributions.

DR. CLARENCE O. SIMPSON, St. Louis: I came here this morning in the capacity of a student rather than a critic. Knowing the two gentlemen who were to open the discussion—Dr. Volland and Dr. McGeehee—I felt sure there would be full discussion, and believe that the time would be so well occupied that the discussion would probably only be stopped by the chairman or by the physical exhaustion of the stenographer. But as Dr. Volland is not here the discussion has been reduced fifty to seventy-five per cent.

Knowing the efficiency of the two gentlemen as equestrians in riding their favorite hobby of cavity preparation, I

did not take notes and did not expect to take part in the discussion. However, I cannot pass a paper so valuable as Dr. Ferrier has given us this morning, on a subject so much needed by the profession at large. There seems to be no one thing—among the many things—in which the profession is so negligent and short-sighted, possibly dishonest, as the preparation of cavities. Dr. Ferrier has repeated many points which are not new, and he has emphasized, as it is necessary to continually emphasize, many points and details in scientific cavity preparation. I am glad to see that Dr. Ferrier has the courage to suggest some improvements on cavity preparation as usually taught, particularly in the conforming to a degree the gingival outline to the outline of the gum. That is a thing I have been considering for years, and insist that it is only proper since we have recognized this anatomical feature in other work. For example, we conform the band of a shell crown to the outline of the gum, we do not make these bands on a straight plane. The student as one of the first steps in making crowns is taught to outline this crown band to the gingiva. Why should we not follow this in cavity preparation? I do not believe that a flat gingival seat bucco-lingually is correct, because it will do one of two things—it will either come from under the gum margin at a very susceptible location, or it will at its deepest point be entirely too far under the gum septum, endangering the gum septum in the placing and finishing of the filling. So it seems entirely correct to conform to a degree the outline of the gingival margin to the outline of the gum itself. I have followed this plan, not only in cavities of the third and fourth classes, but also of the second class. The outline of the normal gum curves occlusally from the labial to the proximal on the anterior teeth about three millimeters. The extremes of this curve averages about three millimeters in the anterior teeth and shades back to about one millimeter in the posterior teeth. That is with normal gum tissue. But how often do we find normal gum tissue? We have absorption of gum tissue, but I do not hesitate to conform the gingival outline to an absorbed area. I make a flat seat and extend that margin gingivally to conform to the outline of the gum, making not a straight line, not a convex line toward the cavity, but sometimes a concave line. With the flat seat mesio-distally we have ample resistance form to take care of the stress that Dr. McGeehee has mentioned in connection with the striking of foreign substances, and as stones in the "seedless" cherry pie.

Another point is the depth of the cavity. I believe in following the Black methods, but error has often been made in cutting the cavities too deep. I believe that a gingival seat of two millimeters mesio-distally, sometimes less, is sufficient for most any cavity. Deeper than that encroaches too closely upon the pulp, which should be avoided.

Another point I wish to suggest is the one mentioned by Dr. Ferrier in regard to beveling the gingival cavo-surface angle for inlay preparation. I believe we can secure better fitting inlays with a bevel there, because it carries out the idea that we have always considered necessary, in inlay fitting, that is, improving the margins by polishing to a thin edge, and burnishing them to the cavity margin; and a butt joint at that point in my hands cannot be adopted as readily as one where there has been some bevel made. This is not for protection to the enamel rods, but for the purpose of fitting the inlay.

There is so much to be said on this subject of cavity preparation that it is hard to choose the essential points and attempt to discuss them in so short a time. I wish to thank Dr. Ferrier for his able presentation, and for having the courage to vary slightly from what we may call the "old line" cavity preparation.

The toilet is a very important point.

There should be careful examination made in regard to the removal of superficial decay, not only the deep areas but superficial decay. Often the decay has extended laterally much farther than we would anticipate if we did not apply some dehydrating medium and make careful examination, even to the extent of staining it to determine whether there is superficial decay beyond the outlines.

Another point of cavity toilet which should not go unnoticed is the protection of those cavities which have been prepared for inlays and the patient dismissed for subsequent sittings. I believe the common practice is to stick in a little temporary stopping. This is not perfectly sealed and is often dislodged when the patient returns. These cavities should be protected, and I have been able to do it with temporary cement. You might hesitate to do that, but I assure you it can be done by flowing temporary cement into these cavities, then removing it by drilling into the center of the cement and fracturing it. You can feel sure then that the cavity has been sealed during the interval that the patient has been absent.

I thank you.

DR. WALDEN I. FERRIER (closing): I think the subject has been pretty thoroly covered by those who have preceded me.

I would like to refer to the last gentlemen's statement in regard to the butt joint in an inlay. He misunderstood me. I agree with him that the gingival margin should be beveled in inlay preparations but in the step portion of the cavity the cavo-surface angle should not be beveled because the enamel rods incline towards the sulcus of the tooth. When you make the walls parallel you have taken care of the short rods. I mean the occlusal portion of the cavity, not the proximal portion. The doctor misunderstood me.

He has answered as well, probably better, than I could, Dr. McGeehee's criticism of the convexity of the gingival wall in cavities of the proximal surfaces of incisors and cuspids. As he says, if you make the gingival wall flat, I mean at right angles to the long axis of the tooth, it will not be covered by the gum tissue in susceptible areas; but if you curve it, follow the gum line, it will be placed in an immune area its entire extent; the resistance to displacement will be increased instead of diminished as this curvature offers more surface for resistance than a straight line would. However, there is usually enough resistance obtained for mastication in the ordinary cavity preparation. The principal reason I use this form of preparation is for extension for prevention. Many of these operations that are otherwise good are not extended enough at the linguogingival angle to be covered with gum tissue, and there they fail. Seventy-five per cent. of these operations fail at that point, and that is why I so extend it.

As to the use of rubber dam, I am radical about the use of rubber dam I suppose, but I cannot work well without it any more. Dr. McGeehee has taken issue with me in that it is impossible to prepare a cavity without a rubber dam. Possibly I should not have made that statement. If you keep the tooth absolutely dry thruout the operation you can probably prepare the cavity correctly but you are consuming enough time in keeping the tooth dry to place three rubber dams, because it is a simple procedure, so it is really a time saver.

I said that in preparing the buccal and lingual wall of bicuspids and molars, I did not make them parallel when I desired to use gold foil. Dr. McGeehee's criticism is well taken; the paralleling of these walls is the Black method and is a good preparation, but I save some tooth structure, and if you notice I said the paralleling of these walls would be an added but not a necessary convenience, that is all.

The contact point. That is a good point to bring up, but you cannot cover

everything in a paper like this. I could have consumed the whole time in the discussion of almost any one phase of cavity preparation. Where the crowns are bell-shaped if you make the incisal excavation too near the incisal angle you will place it in such a position that there will be danger of fracturing the angle, and to make a new contact point is the best way around this difficulty.

As to the Wedelstaedt step, I do not think that Dr. McGeehee understood my reason for using it. It is for convenience only, nothing else. We remove the angle because we cannot place the foil in the incisal angle, using the correct line of force in these distal surface cavities in the upper left cuspid. It cannot be done. At least, I have never seen it done, and many men agree with me. But by removing that angle and preparing an incisal step it makes the placing of the foil just as simple as in the incisal step of the central incisor, and that is very easy of execution. It makes a strong, substantial operation, and one that does not display too much gold.

Dr. Steele brought forward some objection to my grinding the pulpal surface of the inlay. I have done that and made a better fit at the gingival wall. He said if the inlay does not fit you had better make a new one. That is right in a majority of cases, but I want to say that no inlay fits. You have a two per cent. error in the shrinkage of the gold that you cannot get away from any way you fix it. I have repeatedly ground the pulpal surface, and having the walls parallel, or almost so, have secured a better joint at the gingival wall. If we could make these inlays absolutely tight at the gingival wall so that there would be no gum irritation we would not be making any gold foil operations. We get fairly good margins all right, but not so good as with foil. But I am not condemning the inlays; I use them in many cases.

Now as to the scientific features of dentistry. Dr. Steele said there is nothing in dentistry that is scientific. I do not think he meant that dentistry is not at all scientific, because I am sure the doctrine of extension for prevention as advocated by Dr. Black is absolutely scientific. I may not know what the definition of science is, but it seems to me that if you call the prescribing of drugs for an ailing patient a scientific procedure, then surely the cutting of a cavity in a tooth so that it will remain immune to future decay is a truly scientific procedure. I thank you.

THE POST-GRADUATE DENTAL MEETING.

By C. R. Lawrence, D. D. S., Enid, Oklahoma.

(Read before the National Dental Association at Its Twentieth Annual Session, Louisville, Ky., July 25-28, 1916.)

IN DISCUSSING this subject with you men who are guiding the destinies of our State Dental Organizations, it seems a logical thing to do, to first take an invoice of our societies and see if we are measuring up to our greatest possibilities.

With the birth of dentistry, there naturally came into existance the dental college, the dental journal, and the dental society; and these may be termed the progressive forces of our profession. Each of these forces has its particular sphere of work and usefulness, and the intermingling of these forces has made dentistry an important profession. Each of these forces has made progress; but has the dental society made the progress that can be claimed by the other divisions?

We are practically all agreed that the dental college has made wonderful progress. This progress has been due to a careful study of the needs of these institutions, and an execution of these needs, from time to time.

The same in a measure may be said of the dental journal, but what of the dental society? Has it made any wonderful strides? Are we not conducting our meetings in about the same way they were conducted fifty years ago?

Most dentists now days like to talk at times about the progress of dentistry, and we as individuals like to feel that we are units of this progressive movement, but at the same time we must admit that the advance of the general body of the profession is painfully slow. This cannot be attributed to ignorance or lack of ability in the large majority of dentists, but it is possibly due to self-satisfaction with ourselves.

Self-satisfaction too often gets a professional man into a rut, and once he gets into a rut, he usually wears it a little deeper each year and then it takes a tremendous effort to get him out. This is equally true of dental societies, and if we will only stop and take a look at our work for the past fifty years, we find that we have been running along in about the same old channel for that length of time. Self-satisfaction,—feeling that we are accomplishing about all that it is possible for us to do, has brought about this feeling.

We have been so well contented with ourselves and the old methods of conducting our meetings, that we have not even taken an invoice to find out just where we stand. We find the following clause in practically all of our society constitutions: "The object of this society shall be to promote the advancement of the dental profession in education and science of dentistry." This must mean the advancement of the individual members of the profession. Have we attained this object in any great measure? Let us seriously consider a few questions and see.

1. "Why we do not attract more dentists to our meetings.

2. "Why we cannot hold the attention

of the masses of those in attendance for any length of time.

3. "Why the boys after they are in attendance have to be rounded up in order to get them into the different sessions.

4. "Why a large number of those in attendance would rather spend their time with the exhibitors.

5. "Why a large number of those in attendance will not spend more than three days at a meeting."

These are some of the questions we must answer and solve to our satisfaction before we can hope to measure up to the object as set forth in our constitution.

But how are we going to advance the individual members of the profession in education and science of dentistry unless we can get their attention? Dentistry will never progress just because a few men do things in a more scientific or better way.

Of course we will always have a few men in our profession who will of their own initiative, keep right up to the front in any progressive movement, but a few men do not make dentistry; dentistry will always be judged by the ability of the rank and file of the profession and the sooner we find out the best means to advance the rank and file of the profession, the sooner we will arrive at the object of the dental society.

While the dental college and the dental Journal are important factors in our progress, we cannot deny the fact that the masses of our profession must be moved forward thru the dental society, and to do this our dental meetings must be conducted along more interesting and profitable lines. The dental college is the principal force in the early or formative period of a dentists professional life, but after this period is passed he usually looks to the dental society to be carried forward to greater heights.

The old state society meeting with its Fourth of July management, its barbecue, base ball games, with sight seeing trips and lunching on pretzels and pickles between acts is doomed—and the wonder of it all, is that it lived to be of such ripe old age.

The old style meeting wherein nearly everything is finally left to somebody else with the result that there is much confusion and only a few grains of wheat are found among the chaff of a very ordinary program, is doomed to pass away and something better must take its place. In fact something better is taking its place. The advance guard has been on the ground some four or five years and they have blazed a trail over which other societies can travel without any fear whatever of being wrecked in traveling to a higher plane.

The dental society needs more scientific management; our programs must be mapped out with some system and there must be a man at the head ready to use the big stick if necessary to see that everything moves along. When a body of dentists close their offices and spend their time and money to attend a dental meeting they have a right to expect that they will receive something in return equal to or above this sacrifice.

While of late years the interest in dental meetings has been increasing and I would in no way belittle the good work that has been done; yet we are all aware of the fact that these meetings have not been of sufficient interest to claim the full attention of those in attendance; not to say anything of the large numbers we have failed to attract to our meetings. There are probably various reasons for this, but to my mind the foremost reason is that too many who are on our programs are just plain dentists and not dental teachers.

Most dentists now days attend dental meetings to learn something; there was a time when the chief attraction was the possibility of having a good time, but to learn it is generally necessary to have a teacher.

A man may acquire a knowledge of

music, latin, astronomy, or even dentistry without an instructor other that his books, but they don't do it. It is a well established and conceded fact that we must have teachers if we are going to acquire much knowledge.

There is a vast difference between teaching a thing and telling a thing. Teaching a thing is getting the other fellow to know—to know it well enough to use it and profit by it; telling a thing is just interesting him temporarily, or in one ear and out the other.

In most of our dental meetings we have been having things told us. No person has a right to seriously criticize any methods or plans without offering something better and in doing this we feel that we have something decidedly better in the post-graduate dental meeting that should take the place of our old methods. My principal object in referring to the past is to impress upon your minds some of our short comings and invite you to a closer consideration of conditions confronting us at this time.

Almost all the professions make such progress in these days that it is hard to keep up to date therein. Some professions offer better opportunities than others for post-graduate work. The medical profession has its great hospitals, its clinics, its post-graduate schools ready to welcome the seeker after more knowledge and urge him on to greater activities.

The school teacher can turn to the great universities for help. The musician can always find a place within easy reach where he can go and receive higher instruction. The architect, the preacher, the lawyer have equal opportunities. but the poor dentist if he ever gets the progressive spirit worked up to a stage of activity, which way can he turn to satisfy his cravings? Can he go to the colleges, the post-graduate schools, the clinics? No. Has he the advantages offered any of the other professions for post-graduate work? No. Then he must turn to the dental society for this higher instruction and far too often when he does this he turns back because he does not find what he wants.

With the growth and importance of dentistry there has grown to be a demand for higher instruction and to furnish this to the masses of the profession should be the principal mission of the dental society of today.

Along with the new dentistry we must have the new dental society giving this post-graduate instruction.

The dental society has never had a greater opportunity to be of real value than by giving its members this higher instruction that they are so eagerly seeking.

It has been demonstrated on several occasions that the boys are literally hungry for this instruction. Are we going to let them get this from some itinerant instructor or from some dental salesman; or from some underbaked uninteresting man reading a dry paper before our society? Are we going to let things drift along in this way when there is a much better way at our command?

Far too often the men on our programs are so uninteresting that it is no wonder the boys drift away and spend their time with the exhibitors who are generally men of some personality and can keep the boys interested. You can never teach a man anything unless you can get his attention and to command attention we must have men on our programs that are real teachers or men who can "deliver the goods."

Concentration of thought is essential if we acquire knowledge and it is utterly impossible to have concentration of thought without attention. It is the masses of the profession we want to reach and in the dental profession as in no other are the individual members looking to their professional society for advancement.

We can hear on every corner the hue and cry that the dental profession is now passing thru the most revolutionary

epoch of its history and so it behooves each and every member of our profession to take advantage of each and every opportunity offered him to move forward.

Many a man of the dental profession who has been resting secure and satisfied with his past achievements is beginning to realize that he must look to the dental society more than heretofore to keep him abreast in this forward movement.

There is a tendency all over our country to reach out and get this higher instruction, but in most instances it is being done by small groups of men which not only makes it more expensive for each individual but it does not carry with it the enthusiasm and results that naturally accompany the larger efforts.

In our profession we have producing agents and we have distributing agents. We have at this time a great many producing agents; and as the work of our Research Institute is extended these producing agents are going to be increased; but along with this increased production we must improve our distribution service. We are receiving a great mass of valuable material and if we are to derive the full benefit from this we must have the best possible agents and methods for a proper dissemination of this knowledge.

We cannot go along having any Tom, Dick or Harry dishing out stuff to us in a hap-hazard manner. What we want, need and must have is this information imparted to us by real teachers.

It is here the post-graduate plan or teaching system fits in pre-eminently; and it is here that the state societies can best serve their purpose by improving their distribution service. By so doing, we no longer will have to depend on the process of absorption thru the medium of printed articles or thru second hand information. The methods and means are taken right to the consumers, so to speak, and they are not only taught to many at once, but they are taught right.

The principles of cavity preparation were proven long ago, yet it took many years for a proper dissemination of this knowledge. This was largely due to our methods of distribution of knowledge, or the lack of proper teaching forces. Any dentist can derive more benefit in one hour from a real teacher, than he can in ten hours from a person who does not possess the teaching faculty.

So it would seem that in view of the things confronting us that the state dental society could be of no greater service to its members than to provide real and definite post-graduate instruction by authorative teachers, even tho such instruction must be in short courses as yet.

Of course we fully realize that no dentist can receive a full post-graduate course in one week; but the sum total of these efforts in a few years time will result in a tremendous amount of information being imparted. It seems best that this instruction should come in short courses. This gives an opportunity for the proper absorption and assimilation of this information.

Post-graduate instruction as now being carried on by state societies consists in these societies securing prominent teachers of our profession by giving them some real money above expenses, and having them give a series of lectures and clinical demonstrations before the whole society. By this plan the teachers now reluctant or unable to afford the luxury of teaching gratis can be tempted forth to our great advantage we should also remember that real dental teachers are not sticking around every cross-road; nor can they be found in every city. These lectures are mapped out with a definite plan and object; and the whole program is conducted on a definite schedule just as any school is conducted. Each lecture is required to give not only one but several lectures and enough time is set aside for each lecturer to give him an opportunity to carry his subject to some definite conclusion. As a rule these lectures are fully illustrated with lantern

slides, drawings, or moving picture films and are especially adapted to the requirements of the society.

Under this system you do not have to torture yourself trying to listen to some one reading a dry paper or trying to listen to someone who cannot interest you; but on the other hand by this system you are thrilled by having the teacher drive home each word as it falls from his lips. Under such conditions there is no going to sleep; there is no lack of general interest; no longer will you find the boys loafing around on the outside or in the exhibit rooms during the different sessions and no longer will valuable days and evenings be fritted away. You can have under such conditions all the pleasures of association as in the past, but when you return to your home you feel and know that you are carrying something more away with you besides pleasant memories.

We all have had the experience of trying to listen to a scholarly sermon read from manuscript, yet with how much more force were we able to grasp the meaning of that same sermon delivered by another man without manuscript.

The object of a meeting of this kind is not to teach the new things exclusively but it is also to give a more thoro and better understanding of many of the older things.

The imprint left on the minds of the men at such meetings does not die away when the last word drops from the lecturers lips; but on the other hand the seed is sown on favorable soil and it produces a bountiful harvest. You can, under this plan, entirely eliminate the "Commercialism" that is being carried on so extensively by many men who appear on our free programs.

The money proposition seems to be such a bug bear, when the question of a post-graduate meeting is under discussion that I feel justified in discussing it to some extent.

First of all the societies, especially the smaller societies, that are now trying to operate on up to date principles upon the small dues collected each year, are not on a sound financial basis and will go bankrupt before they get very far toward maintaining first class state organizations.

To do this it is necessary to publish a bulletin. Certainly every society should maintain a bulletin for it is a splendid investment; then we have our oral hygiene campaigns; legislative matters to look after; prosecution of illegal practitioners to attend to; these together with the contributions we are called upon to make for worthy causes and the many incidental expenses of the society, takes about all the money that is collected for dues.

So if the society is operated upon up-to-date principles all the money received from the small dues each year is gone before we get ready for the big show; you then call for volunteers and you generally get what you call for.

It is very nice to think of the old theory that we will always find men in our profession who will spend their own money preparing lanternslides, drawings, moving picture films, etc.; not to say anything about the hard work and loss of valuable time such things entail and then expect them to close their offices for many days each year and travel over the country that we might be benefited —all without compensation. A beautiful theory but it will not hold out in practice.

If the dentist received the large fees of some other profession such a thing might be more practical.

Dental societies are just like any other organizations, you cannot accomplish the things worth while without money. If you are operating along this line you are up against a stone wall and the sooner you remove this obstruction the earlier will be your progress.

Many organizations outside the dental society are realizing this fact and are setting forth to face the change that time has put before them.

If we are to conduct post-graduate dental meetings we must have more money and there is only one way to get this money and that is from increased dues.

In Oklahoma we have a clause in our constitution which states that the Executive Council may make a special assessment upon each member attending the annual meeting.

Each of our members now comes to the meeting with his regular dues paid right up to date and in addition to this, for the past five years, he has been required to pay five dollars each year for post-graduate fees. Members who do not attend the meeting are not required to pay post-graduate fees. It is a very easy matter to get your members to pay this additional five dollar fee, or whatever amount you wish to make it, especially when you give them to understand that they are going to get value received.

The greater part of the expense incurred in attending any dental meeting is railroad fare and hotel bills, and just for the sake of argument, we will say this will amount to twenty-five dollars. Thousands of dentists have been attending these meetings and probably have been getting the worth of their money, but under the old plan, they have been spending practically the whole amount on themselves, and contributing very little, if anything, to the management of the show. In other words, in many places, we have been attending home talent plays. Home talent plays are all right, provided you have talent and enough of it, but the time is past when we can expect to be satisfied spending our valuable time and money trying to listen to inferior talent.

So why not add five dollars to this twenty-five and by a cooperative effort spend it in such a way that it will bring many times the returns we have been receiving from our meetings.

The post-graduate plan for state meetings is no experiment. It has been in successful operation in our state (Oklahoma) for five successive years.

The Tri-State meeting of Kansas City, was the outgrowth of a desire to have the post-graduate plan carried out on a larger scale and the success of this meeting demonstrated beyond a shadow of doubt that this plan should be adopted by other states.

This meeting also demonstrated that the past successes of the post-graduate plan cannot be attributed to any local condition that may prevail in any particular section or state.

I am fully aware that we are liable to grow chesty at times and over estimate things that have been accomplished, and for fear you may think I am in that frame of mind I am taking the liberties of quoting some "unsolicited testimonials" regarding this meeting.

Dr. C. N. Johnson at the close of his last lecture had this to say:

"I want to make this statement to you. I do it gratuitously, without any solicitation whatever or consultation with the committee who have these matters in charge."

"I want to tell you that in the conduct of this meeting, in the interest shown in the subjects discussed, the courtesy shown the speakers—in short, taking the meeting as a whole, I have never seen anything to surpass this particular meeting."

"I shall take a message back to my own city that the men in this locality are doing things that are worth while."

In an editorial on the Kansas City meeting in the May, 1916, Dental Review, Dr. Johnson has this to say:

"On March 20 to 26, 1916, the three states of Kansas, Oklahoma, and Missouri joined in a meeting at Kansas City, Missouri, which will be memorable in the history of dentistry in the west. More than one thousand men representing 18 states were in attendance and there was an intensity of interest thruout the week that surpassed anything ever witnessed at a similar gathering of dentists."

"From Monday when the meeting opened, till Saturday afternoon when it closed, there was never a lapse in the attendance, nor a lag in the interest."

The audience would sit for three hours in succession, listening to lectures and then asked for more.

"The meeting was conducted on the lecture system entirely, no clinic being given."

"To go into details regarding the meeting would be superfluous and, in fact, impossible, on account of the many and varied features of interest; but to show something of the spirit manifested it is only necessary to state that after Dr. Price's lecture more than $6,000.00 was raised for the Research fund of the National Dental Association."

(This amount was subsequently increased to $7,000.00.)

"When it was realized that each man at the meeting had paid $5.00 for the privilege of attending the meeting, such a contribution speaks volumes for the liberality of the dentists of the west."

"Altogether this meeting will long stand out as an important mile stone in dental progress, and our congratulations are herewith extended to those associated in its management."

Dr. J. P. Buckley, president of the Illinois State Dental Society, has this to say in his president's address to this great society:

"On March 20 to 26 there was held at Kansas City, the Tri-State meeting of Kansas, Oklahoma, and Missouri. This meeting was conducted along the line of a post-graduate course, such as we started in Oklahoma four years ago. The idea has been adopted by several other state societies. It has been my privilege to have been associated as a teacher with four such meetings, and from my personal observation and experience I feel that this society would do well to consider seriously adopting such a course for our next meeting. This is not a recommendation, but a suggestion which I trust will be given due consideration.

This Tri-State meeting was, without doubt, the greatest meeting of its kind that was ever held. Over one thousand men came from eighteen different states, paid $5.00 in addition to their regular dues and they stayed for the entire meeting, which began Monday morning and closed Saturday afternoon.

The interest manifested in every lecture indicated that the profession is truly alert to their responsibility. These men were simply hungry for the truth. Time will not permit me to discuss this meeting further now; but I shall refer to certain specific instances relating to it later on."

Such words of praise could be multiplied by the hundreds, especially from the rank and file of the profession, or from men who are interested in our meetings.

Why are these men loud in their praises of such meetings? Simply because they are getting what they want and in a most interesting and profitable way.

It is very doubtful if the sum total of interest taken in this meeting has ever been equaled at any dental meeting.

I make this statement based upon the fact that practically every dentist present attended every lecture from Monday until Saturday afternoon.

It is very seldom that you find as many as one thousand dentists listening to a single paper or lecture, but when you take into consideration that this interest was manifested for six days, you may know there was something to maintain this phenomenal interest, and understand why the men who know, are loud in their praises of the post-graduate plan for state meetings.

No one was permitted to attend this meeting who was not a member of his state dental society and had paid his 1916 dues.

This rule was rigidly enforced, and almost 900 of the 1250 eligible dentists of the three state societies attended the meeting.

There are so many factors to be taken into consideration in conducting a meeting of this kind, that time will not permit a discussion of them in a paper of this length.

However, I wish to state that such meetings cannot be planned and successfully carried out without some work. Conditions must be studied and things mapped out accordingly.

I have never heard but one argument presented against the post-graduate dental meeting, and it is that such meetings fail to develop home talent.

More state dental meetings have been killed by playing home talent than from any other one cause.

The smaller district society is the proper place to develop home talent, and no dentist has a right for even a try out in the big league until he has a mighty good batting average in the smaller league.

It is unreasonable to suppose that you can always be a winner, and play to a full attendance by the exclusive use of local talent.

If you have local talent that is up to the highest standard, by all means make use of it; otherwise go out and get the talent you need to help put your society in the running.

I am a firm believer in the development of home talent and this kind of work must be carried on; but it should be done in its proper place, and not at too much of a sacrifice of other things.

It would be folly for us to try to prevent the birds from flying over our heads, but we can keep them from making nests in our hair.

It is equally as great a folly to think that post-graduate dental meetings will stop the development of talent, but on the other hand, such meetings do prevent inferior talent from getting on our program and spoiling our more important meetings.

So progress belongs to the men who do things and not to the ones who just think about them. There is just one way to progress in dentistry or anything else and that is to quit the old as soon as it is demonstrated that something else is better. And quit means quit; don't go the half way route and then condemn the new method because you failed to follow out what some one else has found out to be better.

The dental societies that stand around and just think and talk about things never get anywhere. Action is the big word and action requires that you get yourselves by the boot straps and pull yourselves out of that old rut.

The Illinois State Dental Society, under the guidance of that energetic and able leader, Dr. Arthur D. Black, demonstrated to the dental profession several years ago that it pays big dividends to have your state organized on what is commonly known as the Illinois plan, yet we find several state societies still running along in the same old rut, and have made little or no effort to get out. Even the National Organization stood around for several years before they made a move to profit by what had been demonstrated to be the right plan for dental organizations.

Discussions.

Dr. John P. Buckley, Chicago, Ill.

Mr. Chairman: Dr. Lawrence quoted Dr. Johnson in a recent article, but he did not quote him accurately. Dr. Johnson, in addition to what Dr. Lawrence has said, made this remark or statement in the article referred to: "If there is any one to whom the great success of the Tri-State meeting can be ascribed, that man is Dr. Lawrence." (Applause.)

For three years, as a member of the Board of Trustees of the National Dental Association, I think I have attended every session. The Board of Trustees are to meet at 3 o'clock this afternoon, but I thought I would stay here and listen to this paper of Dr. Lawrence and add a word of encouragement for what he has done because I knew that neither Dr. Black nor Dr. Rhein would be pres-

ent, and I think under the conditions I may be pardoned for my absence at this time from the meeting of the Board of Trustees.

As Dr. Hetrick has said, one of the disadvantages of being on committees is that you do not get to hear much of the meeting or learn what is going on, but some one or a group of men have to do this work.

I have attended a great many different dental meetings; I never attended any, not even the Tri-State meeting in Kansas City, where, when I left, I was so thoroly tired as the meeting I attended at Oklahoma City, for that is the Oklahoma way—the first post-graduate course given by any state society. I have attended many post-graduate meetings since, but I have not seen men do as much hard work as the three men chosen for this first post-graduate meeting, not even at Kansas City, because they had more teachers and more time. The reason that these men got something, if they did, from the men who were present at Oklahoma City at that time and at each succeeding meeting since, is because Dr. Lawrence and Dr. Shobe and one or two other men there were on the job. That is the reason, and they saw to it that the men who were selected as teachers delivered the goods if they had the goods in them. So I am here this afternoon to emphasize in my humble way that part of the commendation of Dr. Johnson which Dr. Lawrence omitted. Dr. Shobe and Dr. Lawrence were the two men that started this movement which is going to result in so much good if the state societies alone do as Dr. Lawrence suggested today, recognize its work and take it up, then act, and act now, and not to be afraid to change a plan on which the meetings have been conducted for the last fifty years as Dr. Lawrence has said.

I do not think it is necessary for me to say a single word further about this great meeting that was held at Kansas City last month. You know today there are so many things coming up, dentistry is being recognized more than ever before, so that it is absolutely necessary for every man to be on the alert. Let us take this one phase of dentistry that is recognized as focal infection and the relation of local foci of infection to systemic disease. It has broadened dentists, it has aroused the medical profession, that we must if we are going to meet the responsibilities placed upon dentists today, be on the alert. Every individual member of the dental profession must be on the alert, and if there is any one thing that great meeting at Kansas City demonstrated more than any other, it was plainly shown that the dentists of the country are ready to assume their responsibility and are endeavoring to carry the load. They are anxious to learn. They sat there, as has been said, with their ears open from Monday morning until Saturday afternoon, absolutely hungry for information, and I have never talked to a group of men where there was such a feeling of hunger for what you are to say if you had something to say, as was so evident at that great meeting at Kansas City.

Dr. Lawrence has emphasized the precautions to be exercised by the men at the various meetings in selecting those to attend who are teachers. What is a teacher? Dr. Lawrence has said that when you teach you must put the information or idea in such a way that every man takes hold and gets it. There are two ways by which a teacher can interest his audience; there are two ways by which a teacher in our common schools can interest the pupils, and that same thing applies to grown individuals. One is to arouse curiosity. If I were a good story teller I could stand here for an hour this afternoon and interest you because I would arouse your curiosity, but I would not teach you anything. A teacher that really teaches is the one who really holds the interest of the audience by virtue of the fact that he can show that audience that that which he

is endeavoring to teach has some direct relation to the work they have to do. If you cannot do that thing, you are not a success as a teacher. A successful teacher must have a method of procedure and what is the method? The method is a way, is a process, a means by which ideals set up are realized. That is all. If you do not have a way, a process, or the means by which the ideals you may have can be realized by the other individual, you are not a teacher.

One of the great difficulties, as it seems to me, in this post-graduate idea as conducted by state societies, is that you have failed to develop home talent. Dr. Lawrence believes that home talent had better be developed in the local society. That may be well and good, but I have felt sometimes that if so much talent from the outside had not been imported and more had been expected of the men at home in the way of teaching and of giving something, just as good results might be accomplished. And so I do not want you to lose sight of the fact that one of the things you ought to do is to develop home talent. I do not want you to lose sight of that fact.

Dr. Lawrence made a significant statement here that is of the utmost interest at this meeting, to the men who are trying to conduct the business of this meeting, the trustees especially.

He made a statement as to the Tri-State meeting in March that 900 of 1200 members present were members of three societies. Think of that; but there were representatives from fifteen other states.

We sat all afternoon yesterday in a warm room trying to decide whether we would interfere with the success of completing the reorganization of the National Dental Association if at this time we raised the dues one dollar ($1) for the purpose of establishing a monthly journal, and if on top of that we raised the dues another dollar for the purpose of giving it to the Research Institute, and the question was thoroly considered as to whether it would be wise to do it at this time. Dr. Conzett got up in an optimistic way, so did Dr. Price and Dr. Hartzell, and spoke in favor of it. I have traveled all over this country and these men are anxious to see the dues increased. I got up there and said I have been around to these meetings just as much as you have, and I want to tell you that in Illinois we have a membership of 1800, and yet at our state meeting this year at Springfield, even tho we thought we had a good program, we only had 300 members present. If Dr. Hartzell or Dr. Conzett or Dr. Price had been at that meeting they would have enthused the 300 present, but would have failed to have enthused the 1500 men who were practicing dentistry at home and were not there. Now, if we could adopt some plan by which we could get seventy-five per cent., instead of fifteen per cent. of our membership to attend our annual meetings, then we could have these men come to us with their enthusiasm and their optimism, and it would be easy to do that which we want, whether to establish study clubs or anything else.

I have only words of commendation, Mr. Chairman and Gentlemen, for this post-graduate idea. I want you all to know, as the Chairman has intimated, that Dr. Lawrence and Dr. Shobe his fellow associate, and Dr. Hetrick and Dr. Hall of Kansas, and Dr. White and one or two others of Missouri, have set a pace that all of us would do well to follow and earnestly consider.

Dr. F. O. Hetrick, Ottawa, Kansas.

There are some things in Dr. Lawrences paper I do not like. It would seem that he intended to cast a reflection on the methods used in the management of the old state societies and the lack of interest.

Right here let us recognize that all dental education and society work has and will be evolutionary. Each particular phase of the work being emphasized at some epoch.

I never attended more enthusiastic meetings in my life—not excepting the Tri-State Meeting last March—than some of the old state society meetings of the early eighties. We had all sorts of experiences and thrills. A good many in this audience were just boys then and some of you were not on earth. Study the evolution of the dental society and you will be surprised at the new things that were a process of evolution. Gold Crowns, Bridge work coming immediately after.

We went to those meetings and worked and studied. The electric dental mallet was used largely, but I saw as good a gold filling as any man in the world today can put in, hammered in with an oxford shoe heel as the mallet. I doubt if Dr. H. J. McKellops ever had or ever will have a peer in the realm of gold filling. When I came into dentistry, nearly every office had some secret that was carefully guarded and you were not allowed to enter their laboratories. They had no idea of disseminating knowledge. It took two men to work out Dr. Lawrence's plan; one man with imagination who said I will stand back of any deficit and Dr. Lawrence to organize the work and bring it to a successful conclusion without any DEFICIT. On his way home from that First Oklahoma Post-Graduate Course, Dr. J. P. Buckley, who was one of the lecturers, stopped off in Kansas City, where he was entertained by his fraternity members, and he was so tired from the strenuous work that he did down there, that it took him nearly a year to see all the fun in one of the jokes pulled off on him.

Dr. C. R. Lawrence and Dr. B. L. Shobe were the dynamos that put that meeting on the map and with it the state society of Oklahoma. True, by the enthusiasm they created they had the entire state society working like beavers to see that it made good, but then again comes back to the secretary who worked out all the plans. Kansas has had one Post-Graduate Course with a progressive clinic attachment and it was a success. It was at this meeting that the agreement for the Tri-State meeting was arranged. Dr. Lawrence was there and helped to boost it. Well it was a tremendous success and is a further evidence that men will congregate where there is something to learn.

It has been a stimulus to the districts of our state to hold their sessions as a post-graduate course. Take the experience at the meeting of the fifth district at Ottawa, where 18 men worked and studied day and night for five days with thermometer standing at a hundred degrees for the whole time. Not one that was ready to quit then.

For the first two days nothing but renewing anatomy, but we knew there was a reason. Not one complaint was registered. There was not a single absence at any one of the sessions for any cause. Remarkable. Not even golf could tempt them. This is exactly what Dr. Lawrence said about the matter that, he saw men who never went to their state meetings, except to have a time and play golf and several other kinds of games, who stayed right thru the Tri-State meeting. I want Dr. Lawrence and his colleagues to have full credit for the opening up of such a great scheme of dental education. Sure it had been thought of before these men put it thru, but they had the faith and nerve to do it. It has been my pleasure to attend the session of the Oklahoma Society in 1913 and I want to tell you that there were none of the men hanging about the lobby of the hotel nor off in their rooms. They were there to learn and were about it intensely. They were not a bit snobbish but if your intention was to learn you were taken right into the brotherhood.

The Oklahoma idea of post-graduate work has not only come to the state society but it has come to the districts as well, and it is not going to stop because we are going to keep it going to work it out. Not just meet in the morning of one day and adjourn

the afternoon of the next day; but we will extend the time of the meeting and make a study club of the district society. As I said before this has already been done in numerous instances.

All hail to Drs. Lawrence and Shobe and Oklahoma who showed us that it could be done.

But just pause a moment and let me pay tribute to the old leaders of long ago. I am as proud of the work that was done then as I am of the work you are doing in this splendid day for it was just as worthy if it was pioneer work. It was in this very city in the year 1888 that one of the great battles of dentistry was fought. Dr. W. D. Miller's theory of the cause of tooth decay being championed by F. Xavier Sudduth with Frank Abbott of New York on the opposite side. The battle waged during the entire session. Our headquarters was at the old Gault House. The men were coming from one of the afternoon sessions and the two Drs. walking together and arguing with Daddy Atkinson just behind them. They tried to stop him but he said "Oh you two old fellows keep right at it, no one can convince the other he is wrong, I am going over and talk to this boy." He came over to where I was standing and put his arm around me and said "Boy, what are your ambitions?" and for over an hour he held up ideals that looked mighty far away to a lout of a country boy. Many of his prophesies have come true and if I am anything more than an old wind-broken, knock-kneed, old work horse—OUT for simply the DOLLARS—I owe it to the greatest dental educational factor in the world—the Dental Association. I thank God that I have lived to see the day when fellows look upon the Dental Association as a place to learn and to give, rather than a place to play poker and get drunk and have a hell of a time or attend social features. Social features were largely cut out of the Tri-State. Surely they had a Tri-State Banquet; there was no emphasis placed upon that feature. I am glad that I am living in this day to see things come to this high standard. But the best part of it all is that I know that I have seen but the beginning and that it will keep on coming after I am gone.

DR. W. O. TALBOT, Fort Worth, Texas: I wish to express the appreciation of the Texas Dental Society for the benefit we have received from the "Oklahoma plan" as it has been commonly called, and we have felt Dr. Lawrence was responsible for that plan. One of our members, Dr. Guy Morgan, of Paris, Texas, President of the Texas State Society, attended the Oklahoma meeting. He came home and told us about it, and we decided to try it out, and the first time we tried the post-graduate work was at the Fort Worth meeting, which was two years ago. We advertised it to the profession of the state and gave them an opportunity to come and get the benefits of the meeting upon payment of the regular initiation fee of $5, which would include membership and this post-graduate work. We had something over 400 in attendance. Up to that time the membership of the society had not gotten above 250 or 275. Most of our members had to ride from 12 to 24 hours when the meeting was held in the central part of the state, and it was a good deal to have that many in attendance. If we meet on the border we would not have so many, as in Galveston, say 250 last year. In Dallas this year we had something over 300.

We have worked the past two years to some extent on the post-graduate plan, cutting down the number of papers to six, with discussion. We used the progressive clinic plan as much as we could and we got along this year better than last. I think we are learning something about it and will get it in shape so we will get the full benefit of it. We certainly do appreciate what we have gotten out of the post-graduate work. It is the proper way, but we feel we should

also encourage the home talent as much as possible. I suggested at our last meeting it would be well to have some of our members write papers, and let them be passed upon by the Executive Committee, and those papers desired should be read and discussed before the state meeting. Those showing merit, and not used before the society should be censored and published in the state journal. We should encourage young men to write papers. We should find out what talent we have in the state and utilize the material we have at our disposal to the best advantage.

DR. JAMES MARK PRIME, Omaha, Nebraska: I would like to add one thought to the discussion of Doctor Lawrence's most excellent paper. My thought is this: A clinic is a good thing in many ways. It may be shown to very excellent advantage the clinicians personal technic. The difficulty arises in that so few are able to see it. This is overcome to some extent in the progressive method. The greatest of all objections to both the table and chair clinics, as well as the illustrated lecture, is the fact that we fail to visualize the idea sufficiently to take it home and put it into our practice. In other words, it is more human to learn to do by doing than to learn to do by seeing others do. So the study club is the final solution, where the thing is not only seen done, slowly and comprehensively before his eyes, but he takes the instruments in his own hands, and under the direction of competent demonstrators, learns to do by doing. Show me a locality where a study club has labored for years along certain lines, under competent demonstrators, and I will show you a locality where the profession is forging ahead, not only in manipulative skill, but, naturally, coming in constant contact with these advanced thinkers, are raised to a higher level of professional life and efficiency. Indeed, these study clubs awaken the sleeping faculties of these boys and when they labor for years there will come men from these numbers who will be heard from, who become teachers of national reputation, a blessing and honor to their profession.

DR. M. E. VANCE, Lincoln, Nebraska: I want to compliment Dr. Lawrence upon the paper of the afternoon, and for the delineation of the methods of the progressive clinics which have been conducted by the Oklahoma State Dental Society for the past four or five years. We men in Nebraska have tried to be in the vanguard of the profession and have looked with pleasure upon the work of Dr. Lawrence and his co-workers in Oklahoma. We recognize Oklahoma as the leader in the present method of conducting dental society meetings. We will emulate her example in the future, as demonstrated by what we are doing here in the National Dental Association this year.

Probably there never will be a meeting of more interest than was the joint meeting of the state dental societies of Oklahoma, Kansas and Missouri held at Kansas City last March, and known as the Tri-State meeting. Every man privileged to attend went away feeling that everything was there for him possible, and he got it. In its organization and conduct Dr. Lawrence was a big factor.

We men in Nebraska have followed the progressive work of the Oklahoma State Dental Society under the guiding hand of Dr. Lawrence and I am sure he is not without honor in his own country. I wish there were more such men as Dr. Lawrence.

Follow the suggestions of Dr. Lawrence, you men who are officers of your society, and bring to your state meetings the best men to be had. It will be the making of your meeting. And in your state society develop the men who have ability and those who show aptitude for doing certain things, get behind them and boost them a little bit, and they will soon be giving clinics and lectures

in adjoining states. If the men in Oklahoma had frowned upon the progressive ideas of Dr. Lawrence we would not have him here today as an essayist before this section. A word of encouragement will go a long ways with most of us.

Now a word as to the importance of the small study club spoken of by Dr. Prime. Every community where there are two or more dentists should organize a study club. What shall you study? Fraternal relations one to another will be one of the most important subjects you could study first. The formation of that club will bring you into closer touch with each other and make you more valuable to yourselves, to your patients and to the community at large. That will do more good than all the dental work you will ever do. your association will become known beyond the boundaries of your community and it will do a world of good in advancing the standard of the profession and of dentistry.

DR. LEON D. LEONARD, Minneapolis, Minn.: I want to make one addition to the suggestion given in the line of speakers coming from far off for post-graduate work, and that is that they may add to the value of the services to that community very much by public lectures given to the public at the time of the society meetings.

This is not new. It is a very nice thing, and gives an opportunity for these big men to give some such information to the public as is of great value to the dentists as well as to the public in general.

DR. L. JAY WALKER, Grafton, West Virginia: There has been much said here about the value of the study clubs and about introducing that factor into the state societies. I can understand how you form study clubs, and understand how a small body of men can agree among themselves to get talent to come in and teach them; but how to get the state society to come in as a whole and do that thing, and thus benefit the whole instead of a few, is where we have failed to understand. I recognize from what Dr. Lawrence has said that he has considerable ability, and he did it once. I would like to know how we can get this as a feature of the state society. We have had trouble in trying to compromise between a new kind of program and the usual program. As it is difficult to cut the old out altogether and take up the new altogether, my question is, how is it to be managed? That must be settled before we can bring about the desired change. Let us have some information on this phase of Post-Graduate feature programs.

DR. J. O. ZUBROD, Evansville, Indiana: There are only a few of us here today from Indiana, I want to say something about Dr. Lawrence's good paper. In my opinion he left out the most valuable part and that was, he did not tell us how he conducted, or how he started this great Tri-State meeting. In Indiana we have thirteen component societies. our master of clinics, and our Executive committeemen are going to get together and allot to each component society one subject for a paper, or one clinic. In these papers that are prepared the essayist will answer his paper, he will not only tell us what we should do, but will tell us how to do it, all of us that are here today are interested in Dental Society work, or we would not be here. We are developing talent in Indiana and have found we have men just as good as anywhere.

Now I would like to hear Dr. Lawrence tell us how he started and conducted this great Tri-State meeting. I thank you all.

DR. LAWRENCE (closing):

I am sure no one, more than myself, realizes that there were many important things not included in my paper. These were intentionally left out, in order to keep the paper within certain time limits.

The object of the paper was to arouse more general interest in the conduct of

our state meetings, and I felt if any one present is sufficiently interested we can talk over details at a later time or I can give you copies of several of our Bulletins which will explain these details.

However I might say there are certain fundamental principals that are very necessary for the success of any state dental organization, and the first of these is to have your society organized on up-to-date principals or what is commonly known as the "Illinois Plan." Then you must have a man at the head of this organization who is capable of directing it's affairs. If you do not have such a man you will fail in conducting post-graduate meetings, just as you will fail in any other undertakings.

There are certain general principles we have to work from and the first and foremost of these is, you must have teachers who are competent. As to the Tri-State meeting in Kansas City, I think one poor lecturer would have dulled the interest and two poor lecturers would have killed our meeting. So choose men for lecturers, you know can "deliver the goods." A man may be a brilliant writer, but a very poor lecturer or teacher. So be careful in this respect.

In making up a program of this kind there is a tendency on the part of the committee in charge to select men they know by reputation but you may not know anything as to their ability as speakers; hence they may be failures, due possibly to a poor voice or something of that kind which has not been taken into consideration. You must have lecturers who can keep the boys interested. There are a lot of such men all over the country.

The next thing to make such a meeting a success is advertising; not the ordinary kind, but good advertising and plenty of it. The boys should be made to realize they are going to get something worth while.

There is no one thing more effective for advertising purposes than a good bulletin. If you do not have a bulletin in your state, you had better wake up, and see that something is started along this line; then select the "livest wire" in your society for editor and you will receive large returns from your investment.

Another consideration is, what do the boys of your section need most? If Dr. Prime has told them how to put in good amalgam fillings, give them something else. Do not give the same thing over and over. They get tired of this. Dentistry is now divided into so many branches we do not need to keep talking on the same subject at every meeting. Avoid those things if possible.

I would not under any consideration have a two or three days meeting, that is not a long enough time for a meeting of this kind. Some societies have tried to put on "post graduate" meetings in two or three days and they have only half done the thing. If you are going to attempt a meeting of this kind do it right or not at all.

Dr. Rhein asked for ten hours time at our Kansas City meeting in order to properly present root canal work, but we could not give him but four and one-half hours and the result was he had to hurry over important points. If you try to crowd too many things into a short time you cannot get them in and the result is that you only get a smattering of what you should have.

In making up the program for the Kansas City meeting, the committee in charge, first took up all the subjects in dentistry; then we sifted things down until we had a certain number of subjects that we considered would be of the greatest interest to the greatest number. We then took up a stated subject and said "where is the best man in the country for this particular subject"? After deciding on the man we then went after him and in every case we secured the man we selected.

A very nice way, if you have a lot of home talent you wish to use, and desire to have what might be termed a mixed meeting, is this: I would secure my

lecturers and put them on in the day time, and have the evening programs made up from the home talent or you can set aside one day exclusively for home talent, but have it the first day for the boys do not like to listen to home talent after listening to "stars."

Question: How did you raise the money for your first meeting?

Dr. Lawrence: We taxed every man five dollars above his regular dues. The first year we did this without anything in our constitution covering the matter but there was a general understanding that everyone attending the meeting would be required to pay this amount. To get round any serious argument in the matter we did this: if any one made an objection we had to let him in at some time because his dues were paid. But we said "These lectures are a special feature, a side issue, and if you wish to hear them you must pay the five dollars but, if you do not care for the lectures you may attend the regular state society sessions which will be held each evening, when we will have our own papers and our business meetings." We had no trouble whatever along this line as every man without a single exception paid the five dollars.

However, the best plan is to get a clause in your constitution stating that the Executive Council may make a special assessment upon each member attending any annual meeting. In that way you have the whole thing on a correct basis and it is flexible enough to meet any financial requirements.

Question: The first meeting was a good deal in the nature of a private contribution?

Dr. Lawrence: Yes, you might call it that. If your constitution has not been changed, that is the only way you can handle the matter.

There is one thing I want to mention about developing of talent. Nothing has been said about it. That is, these meetings cause more fellows to read and study than you can imagine. The first year we had post-graduate work in Oklahoma we had over 200 in attendance and after that meeting we took particular pains to find out how many text books were sold as a result of the lectures delivered. Of one text book there were sold 150 copies as the result of one man's lectures. I found that to be true after every one of our post-graduate courses. That is an important factor. The point is, you must get a man interested before he will read or study.

Why is it the book stores can hardly supply enough Bibles after Billy Sunday has been in the community? Simply because he gets the people interested in matters of this kind. That is all there is to it. So these dental teachers get us interested in their subjects and the result is we buy and read more text books than we otherwise would. These meetings are not only of direct benefit, but of indirect benefit as well.

Another matter that should be taken into consideration is that any person will naturally read the writings of men whom they have seen or heard lecture.

I want to make a statement about the financial side. After the Tri-State meeting in Kansas City, we had a dividend of $2,000.00 to declare. It is better to have money left than to have a deficit. This meeting cost us $4500.00 and our total receipts were $6500.00 so you want to watch out for the business side. By several societies joining together you can get a good exhibit that way where you cannot get it any other way. A good exhibit is a feature worth while. We held the gavel over the exhibitors and put them off by themselves.

The men do not loaf around the exhibits while the lectures are going on. The exhibitors may object to that but we always manage to treat them right and set aside special time for them. I have a good many bulletins we have used in advertising these meetings and if any one is interested I shall be very glad to hand them to you to take home with you.

DENTAL EDUCATION---PAST, PRESENT, FUTURE.

By H. M. Semans, M. A., D. D. S., Ohio State University, Columbus, Ohio.

(Read before the National Dental Association at Its Twentieth Annual Session, Louisville, Ky., July 25-28, 1916.)

ALMOST literatureless, the dental profession arose by inspiration seventy-five years ago. Its growth has been phenomenal, its service has been of inestimable value to the world. Its future development must keep pace with its past. The thoughtful members of its being have the greatest confidence in its future, realizing however that its future usefulness and advancement cannot stop with a content with what it has done. They realize that, becoming an accepted profession, its philosophy is service; its service, a manifestation of effectiveness; and to remain effective there must be manifested an ever increasing measure of usefulness and achievement. Introspection has built its foundation, scientific principles are now shaping its frame work, inspired visions must complete its superstructure. It has been a profession for seventy-five years, because the members making up its body have so considered; it will become a profession of the future because the world at large will so consider. Specialized education and its hand-maiden, literature, creates out of the workers of the world, a profession; but the thinking mind of the world is of a critical existing condition, and governs a specialized growth out of its workers, with hard and fast inspection, before it accepts a specialized work as a profession. High standards and lofty ideals must be the thinking mind of a profession, else it is not a profession. Our past we glory in, our present we defend. Our future belongs to the judgment of the world. Let me quote from Herbert Nelson in the "Rotarian" of March, 1916:

"The professional spirit within any group implies the following:

Useful service for society, not for profit alone but for love of the profession and for humanity.

An organized body of knowledge as a basis.

Definite standards of efficiency.

Definite standards of personal and professional conduct.

Esprit de corps. Loyalty to profession and faith in its service."

Do we fully realize that a great change is taking place in the world? Are we cognizant of the fact that dental surgery must now become a part of general surgery and preventive medicine? That we are no longer living unto ourselves, that our professional existance depends upon a new introspection? And that our educational field of endeavor must progress, must broaden, must assume a wider, better, more thoro scientific fundamental training, if we shall stay with these changes in the world's conception of a professional attainment and service? Fifteen years ago change and advancement was desired from an educational standpoint, but these desires fell in their very conception, not however without great internal improvement being followed in already existing methods and curricula. Again a change and advancement is desired. This time the situation be-

comes imperative, it cannot die in its conception. But we must have the whole hearted support of the dental profession. Dental education will advance in just so far as the dental profession realizes its moral responsibility, and will give its moral unflinching support to higher educational standards. Our educational past has been lean in the knowledge of all subjects, except perhaps the principles and practice of Operative and Prosthetic Dentistry. Our present is but a fair compromise; our future will be governed by the attitude of you, the Profession, in demanding that the collective sciences of Pathology, Bacteriology, Physiology and their accompanying associates shall become a strong integral part in creating men and women who will have a better, much wider scientific foundation and technical training. It has always been that an occasional mind becomes scientifically attuned to specialized work, such as dentistry, without the guidance of an educational institution. The very lack of proper educational facilities, will not keep some men down, these are bound to rise thru their own eagerness to learn the truth. But a profession as a whole will advance scientifically only about as fast as its educational institutions will advance. The scientifically manipulated measures of prophylaxis, the ability to diagnose between, say, suppurative osteitis and putrid osteomyelitis, a working knowledge of the bacilli of the mouth, a systematological knowledge of each patient, immunization, these, and other intelligent equipments are as important today as the knowledge of cavity preparation, or any of the other tooth technical manipulative measures. We are no longer judges of our own being, the medical world asks that the hand-maiden, dentistry, shall become a scientific, truth investigating associate. This will be achieved when the dental profession will allow the past to remain the past, when it will demand that the educational requirements are such that every section of the country will have the advantage of an institution for dental education of high standard, proper equipment and moral and financial support. The time, I believe, has now come when the National Dental Association shall assume the burden of a proper observance of educational standards; that this Association should hereafter not only give its moral support to higher attainments in the educational field, but should insist on a definite and constant observation of the same. Indirectly thru its various commissions having an educational bearing much good has resulted in strengthening and building up weak and indifferent situations in our various colleges. In the past both the dental profession and the colleges have taken more or less umbrage at adverse criticism. Adverse criticism is vastly better than none at all, provided it shows the way to remedy. Progress is a stimulated activity; often stimulated by adverse criticism, or the desire to avoid it. But better yet progress is stimulated by moral support. There is being manifested today, plainly observed, both in and out of our profession, an intense earnest desire to improve the dental educational situation. Our various organizations, The American Institute of Dental Teachers, The National Association of Dental Faculties, The American University Faculties Association, the National Dental Examiner's Association, your own activities as shown in your fathering and supporting the Dental Educational Council, the Oral Hygiene and Research Commissions; all desire an improved curriculum. It is not that we desire to improve now to take care of the needs ten years from now, let the future rest for awhile, and if we awaken the profession and this Association to its obligations, the dental educational present will be taken care of. The present now demands, I thoroly believe, completed four years preliminary and four years dental collegiate training for the dental practitioner. What this new four year course shall be, cannot be fixed now in a definitely planned curri-

culum, the next few years, however, should bring about at least an approximized course, provided earnest unselfish endeavor, with all interested parties, is manifested. The present three year course is an example of objectionable cramming, and lack of proper preliminary scientific and technical training. Dr. Stubblefield but a few years ago said "I am convinced that we have taught too much in the time at our disposal, with the result that we have produced a mental dyspepsia, rather than assimilation, growth and development. What we want is not ingestion, but digestion, so as to permit our men to grow broad and strong. We have not had sufficient time to mature. Put the student in the way to help himself; that is the best you can hope to do for him." Dr. G. V. Black thoughtfully remarked, "I would like to speak on one point that has been referred to in the discussion by one of the speakers. It is a very important point, too, in connection with this matter of education, and we should strive to understand it. The education of the machinist has been referred to, and the fact mentioned that it requires four years to make a machinist. During this four years this man may spend all his time solely in the machine shop; solely at practical work, so that he may be able to turn his journals to a nicety, cut a toothed wheel perfectly, do excellent mechanical work, but if this man has not during this time been studying his mathematics and his physics, the laws of motion; and if he has not been studying mechanical drawing and all those things, he will be simply a mechanic to be directed by the master; nothing more."

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

Report of Tabulating Committee. 1916 (abstract.)

Mr. President and Members of the National Association of Dental Examiners:

Your Tabulating Committee presents herewith its Seventh Annual report:

In compliance with the resolution passed at the Louisville meeting of the N. A. D. E., we have completed the tabulation of the several State Board Secretaries' reports, of first examinations for the year 1916. Dr. Friesell, Chairman of the Tabulating Committee of the N. A. D. E. has also tabulated these reports. We compared our results and a few minor corrections were made; the two reports are now identical, and we feel positive that they are accurate. Having received the audit Dr. Friesell and myself, this tabulation is declared official.

Reports were received and tabulated from forty-five (45) States and Porto Rico. California, Mississippi, Montana and Nevada failed to send reports. California's State Board Secretary is the only one who has refused to send a report. The other three Secretaries simply neglected to answer our correspondence altho they were sent requests by registered mail. However, we succeeded in getting a larger number of reports this year than in any previous year in the history of the Committee.

We are in hopes that for the year 1917 we will receive reports from every state in the Union, with the possible exception of California.

The reports this year were in excellent shape, nearly all being made out according to instructions printed on the back of the tabulation sheets. We wish again to request all Secretaries to carefully follow these simple directions, as by so doing the work of tabulating is greatly facilitated.

The total number of dental graduates in the United States and Canada for the year 1916 was 2917; of this number 2835 were graduates in the United States and 82 in Canada. This is a decided increase over any previous year. The average number of graduates per year for the past seven years being 2109.

The total number of 1916 graduates examined by the 46 Boards reporting was 2269, passed 1892; failed 377. Percentage of failures 16.6, which is close to the average of 16.2 failure for these seven years.

This year is the first that the College of Jersey City has had any graduates reported.

We would once more urge that the Secretaries send in their reports as soon as possible after each examination. If more than one examination is held during the year, kindly send separate reports of each.

If at any time your supply of blanks is exhausted, notify us and a supply will be sent immediately.

Your Committee wishes again to extend our personal thanks to each State Board Secretary who sent us a report, and for the many other courtesies we have received in the past. We append herewith reports of 1916 Tabulation; also cumulative tabulation for 1910-11-12-13-14-15-16.

RESULTS OF TABULATION OF STATE BOARD REPORTS FOR GRADUATES YEAR 1916.

STATE.	COLLEGE.	Total Number of Graduates	Total Number Examined	Examined Passed	Examined Failed	Percentage of Failures	Number of States Examined in
California	Univ. Cal. Col. of Dentistry	29					
	Col. P. & S. Dental Department	45					
	U. of So. Cal. Col. of Dentistry	38	3	3			2
Colorado	Colo. Col. Dental Surgery	40	31	28	3	9.6	7
Dis. of Columbia	Howard Univ. Dental School	42	3	3			3
	Georgetown Univ. Dental Dep't	31	26	16	10	38.4	9
	G. Wash. Univ. Dept. of Dent.	24	17	13	4	23.5	4
Georgia	Southern Dental College	52	50	47	3	6.0	8
	Atlanta Dental College	74	68	62	6	8.8	11
Illinois	Chicago Col. Dental Surgery	150	122	87	35	28.6	14
	No. Western Univ. Dent. School	173	110	92	18	16.3	15
	Univ. Ill. Col. of Dent.	32	30	28	2	6.6	7
Indiana	Indiana Dental College	68	61	55	6	9.8	6
Iowa	Univ. Iowa Col. of Dent.	76	71	65	6	8.4	5
Kentucky	Louisville Col. of Dent.	69	53	50	3	5.6	12
Louisiana	Loyola Univ. Col. of Dent.	3	1	1			1
	Tulane Univ. Dental Dept.	19	15	11	4	26.6	2
Maryland	Balto. Col. Dental Surgery	53	35	26	9	25.7	11
	Univ. Md. Dental Dept.	47	39	29	10	25.6	11
Massachusetts	Tufts Col. Dental School	78	67	61	6	8.9	5
	Harvard Univ. Dental School	53	52	50	2	3.8	4
Michigan	Univ. Mich. Col. Dental Surgery	85	75	74	1	1.3	8
Minnesota	Univ. Minn. Col. of Dent.	81	67	66	1	1.4	4
Missouri	Kansas City Dental College	53	51	44	7	13.7	6
	Washington Univ. Dental Dept.	38	37	35	2	5.4	4
	Western Dental College	44	41	38	3	7.3	6
	St. Louis U. School of Dent.	74	71	65	6	8.4	6
	Barnes Dental College	16	12	7	5	41.6	2
Nebraska	Univ. of Nebr. Lincoln Dent. Col.	25	25	25			1
	Creighton Univ. Col. Dent.	29	29	29			2
New Jersey	College of Jersey City, Dent. Dept.	26	24	3	21	87.5	1
New York	N. Y. College of Dentistry	230	200	130	70	35.0	3
	Univ. Buffalo Dent. Dept.	48	41	33	8	19.5	3
	Col. Dent. & Oral Surg. of N. Y.	128	114	95	19	16.6	3
Ohio	Ohio Col. Dental Surgery	36	34	22	12	35.2	4
	W. Reserve Univ. School of Dent.	32	31	20	11	35.4	2
	Cin. Col. Dental Surgery	23	13	12	1	7.6	5
	State Univ. Ohio Dental Dept.	34	34	31	3	8.8	3
Oregon	No. Pacific Col. of Dent.	64	43	36	7	16.2	4
Pennsylvania	Phila. Dental College	50	38	34	4	10.5	5
	Univ. of Pgh. School of Dent.	66	66	66			2
	Univ. Penna. School of Dent.	175	133	104	29	21.8	12
	Med-Chi. Dept. of Dent.	78	60	43	17	28.3	6
Tennessee	Vanderbilt Univ. Dept. of Dent.	45	41	39	2	4.8	11
	Univ. Tenn. Dental Dept.	17	14	14			3
	Meharry Dental College	27	21	17	4	19.	11
Texas	State Dental College	34	26	23	3	11.5	4
	Texas Dental College	11	9	4	5	55.5	1
Virginia	Med. Col. Va. School of Dent.	11	11	6	5	45.4	2
Wisconsin	Marquette Univ. Dental School	59	54	50	4	7.4	5
		2835	2269	1892	377	16.6	
Canada	Royal Col. Dent. Surg. Ontario	54					
	Laval Univ. School of Dent.	22					
	McGill Univ. Dept. Dent.	3					
	Dalhousie U. Faculty Dent.	3					
		2917	2269	1892	377	16.6	

SUMMARY.

Number of State Board Reports Received	46
Number of State Board Reports Tabulated	46
Total Number of Applicants Examined and Passed	1892
Total Number of Applicants Examined and Failed	377
Percentage of Failures	16.6

CUMULATIVE RESULTS OF TABULATING STATE BOARD REPORTS FOR GRADUATES YEARS 1910-11-12-13-14-15-16.

STATE.	COLLEGE.	Total Number of Graduates	Total Number Examined	Examined Passed	Examined Failed	Percentage of Failures	Number of States Examined in
Alabama	Birmingham Dental College	54	50	38	12	24.	1
California	Univ. Cal. Col. of Dent	132	1	1			1
	Col. P. & S. Dental Dept	191					
	Univ. So. Cal. Col. of Dent	231	12	12			4
Colorado	Colorado Col. Dental Surg	207	191	176	15	7.8	10
Dis. of Columbia	Howard Univ. Dental School	176	46	40	6	13.	16
	Georgetown Univ. Dental Dept	186	144	118	26	18.	23
	G. Wash. Univ. Dept. of Dent	81	65	57	8	12.3	5
Georgia	Southern Dental College	312	287	253	34	11.5	10
	Atlanta Dental College	413	382	309	73	19.1	15
	So. Eastern Dental Univ	2	2		2	100.	2
Illinois	Chicago Col. Dental Surg	817	669	510	159	23.7	22
	N. West Univ. Dental School	908	676	555	121	17.8	30
	Univ. Ill. Col. of Dent	178	167	136	31	18.5	15
Indiana	Indiana Dental College	344	322	290	32	9.9	15
Iowa	Univ. Iowa, Col. of Dent	335	311	289	22	7.0	11
	Drake Univ. Col. of Dent	32	29	29			1
Kentucky	Louisville College of Dent	290	237	209	28	11.8	23
Louisiana	La. State College Dent. Surg	6					
	Loyola Dental College	6	4	4			2
	Tulane Univ. Dental Dept	136	98	86	12	12.2	4
Maryland	Balto. Col. Dental Surgery	383	241	169	72	29.8	19
	Univ. Md. Dental Dept	375	277	196	81	29.2	22
	Balto. Med. Col. Dental Dept	83	64	43	21	32.8	12
Massachusetts	Tufts Col. Dental School	435	361	339	22	6.0	6
	Harvard Univ. Dental School	258	204	182	22	10.7	8
Michigan	Univ. Mich. Col. Dental Surg	489	431	418	13	3.0	14
Minnesota	Univ. Minn. Col. Dentistry	444	400	367	33	8.2	6
Missouri	Kansas City Dental College	288	253	230	23	9.0	13
	Washington Univ. Dental Dept	206	193	186	7	3.6	8
	Western Dental College	273	235	211	24	10.2	15
	St. Louis Univ. School Dent	319	293	269	24	8.1	15
	Nat'l Univ. Arts & Sciences						
	Barnes School of Dent	82	69	54	15	21.7	5
Nebraska	U. of Neb. Lincoln Dent. Col	87	84	84			1
	Creighton Univ. Col. Dent	163	155	151	4	2.5	5
New Jersey	College of Jersey City, Dent. Dept	26	24	3	21	87.5	1
New York	New York College of Dentistry	842	716	504	212	29.6	5
	Univ. Buffalo Dental Dept	249	223	167	56	25.1	4
	Col. Dent. & Oral Surg. of N. Y	414	373	259	114	30.5	4
Ohio	Ohio Col. Dental Surgery	282	238	177	61	25.6	15
	W. Reserve U. School of Dent	208	200	162	38	19.0	4
	Cin. Col. Dental Surgery	99	79	59	20	25.3	6
	Ohio State Univ. Dept. of Dent	247	242	231	11	4.5	5
Oregon	No. Pacific Col. of Dent	339	237	201	36	15.1	6
Pennsylvania	Phila. Dental College	289	183	153	30	16.3	14
	Univ. Pgh. School of Dent	329	319	300	19	5.9	8
	Univ. Penna. School of Dent	1083	615	498	117	19.0	22
	Med-Chi. Col. Dent. Dept	345	239	172	67	28.	9
Tennessee	Vanderbilt Univ. Dept. Dent	257	236	221	15	6.3	15
	Univ. Tenn. Dept. Dent	82	76	74	2	2.6	5
	Univ. Memphis. Dental Dept	5	4	4			3
	Meharry Dental College	182	148	103	45	30.4	17
	Univ. W. Tenn. Col. Dent. Surg	3	1	1			1
Texas	State Dental College	130	87	70	17	19.5	6
	Texas Dental College	96	70	53	17	24.2	1
Virginia	Univ. Col. Med. Dent. Dept	32	30	23	7	23.3	2
	Med. Col. Va. School Dent	66	58	42	16	27.5	6
Wisconsin	Marquette Univ. Dept. Dent	289	277	246	31	11.1	6
	Wisc. College P. & S. Dept. Dent	17	17	15	2	11.7	1
		14833	11645	9749	1896	16.2	
Canada	Royal Col. Dental Surg. Ont	341					
	Laval Univ. School of Dent	138					
	McGill Univ. Dept. Dent	28					
	Dalhousie Univ. Faculty Dent	14					
		15354					

SUMMARY.

Number of State Board Reports Received
Number of State Board Reports Tabulated
Total Number of Applicants Examined and Passed.....9749
Total Number of Applicants Examined and Failed.....1896
Percentage of Failures..... 16.2

Respectfully submitted, T. A. BROADBENT.

The Research Department
CONDUCTED BY
THE RESEARCH INSTITUTE OF
THE NATIONAL DENTAL ASSOCIATION
WESTON A. PRICE, M.S., D.D.S.
President and Managing Director
CLEVELAND, OHIO

THE PATHOGENICITY OF MOUTH STREPTOCOCCI AND THEIR ROLE IN THE ETIOLOGY OF DENTAL DISEASES.

By Thomas B. Hartzell, M. D., D. M. D., and Arthur T. Henrici, M. D.

(From the Laboratories of the Research Institute of the National Dental Association at the University of Minnesota, Minneapolis.)

OUR knowledge of mouth bacteria and their relationships to pathological conditions in and about the teeth is in a somewhat chaotic condition, and, at the present time, when interest in this branch of knowledge is undergoing a revival, it is perhaps wise to stop a moment and sum up what has already been established. The pioneer work of Miller has not been followed by productive investigations comparable to those made in other fields of bacteriology. There are several reasons for this. In the first place, the field has not promised to yield immediate tangible results of practical value, and during the youth of bacteriology as a science its investigators have largely been led to more fertile fields. Therefore, a considerable amount of the work published has been carried on by dentists, inspired by considerable enthusiasm for the work but frequently lacking the training necessary for conducting accurately investigations in so highly specialized a science. For this reason many of the micro-organisms described as new varieties associated with dental disease may probably be contaminating bacteria falsely identified. A bacteriological judgment must be developed before such work can be intelligently interpreted. In the second place, the flora of the mouth is so vast both in numbers and species, and so hard to cultivate, that the technical difficulties have been almost insurmountable. Thus Küster states that "All of the authors who have sought to clear up the bacteriology of the mouth by classifying every pure culture grown from the mouth were soon at the end of their ability. * * * Miller alone culti-

vated over a hundred different kinds of bacteria in a few weeks." Such attempts at classification have seldom served any useful purpose. On account of the failure of subsequent observers to differentiate accurately between contaminating germs and those actually present in the mouth, or between accidental visitants and normal inhabitants of the mouth; on account of their failure to determine accurately the biological characters or biochemical activities of the various mouth bacteria, or their pathogenic potentialities, Miller's vast collection of names and descriptions has remained to us an almost useless inheritance.

From time to time there have been described micro-organisms for which their discoverers have claimed a specific relationship to one or another dental disease. None of these, however, has stood the test of subsequent investigations and we are forced to believe, until stronger proof is forthcoming, that in dental infections we have to deal only with those organisms normally present in the healthy mouth. This conclusion has a corollary, namely, that the mere presence of bacteria will not cause dental infections, or we would all suffer from such diseases. Koch's postulates cannot be fulfilled. We may determine in a general way, by animal inoculation, the pathogenicity of the various germs encountered, but we cannot reproduce, with the bacteria alone, the same dental lesions with which they are associated in human mouth. This has led a number of dentists to view with skepticism the etiological relationships of bacteria and to seek the causes of dental disease elsewhere, as in disturbed metabolism, etc. While it is probably true that mouth infections require in their etiology some other factor, be it constitutional disturbance (such as diabetes and scurvy), or a local condition (such as accumulated tartar or an ill fitting denture;) yet a careful examination of the changes wrought in the damaged tissues leads one inevitably to the conclusion that these changes are the work of bacteria.

While a great many varieties of micro-organisms have been recorded as occurring in the mouth, there are only a few which have been found so constantly and in sufficient numbers that they can be considered characteristic of this region. They have therefore been the object of more intensive study. Fortunately, within recent years bacteriologists have largely abandoned the thankless task of classifying mouth bacteria and have devoted themselves to studying the varying flora in different parts of the mouth at different ages, the influence of varying conditions of cleanliness and health upon the mouth flora, and particularly to learn the disease-producing powers of the various mouth bacteria. Bearing in mind that practically all of the dental diseases are the result of the invasion of the teeth and their investing tissues by micro-organisms, we propose here to review some of these studies and to sum up the facts which we believe have been established.

The distribution of bacteria in various parts of the mouth, and the changes in the bacterial flora at different ages have been the object of a number of studies. These have been reviewed and considerably added to Madame Bräilovsky-Lounkevitch in a paper entitled, "Contribution a l'etude d la Flore Microbienne Habituelle de la Bouche Normale" (Annales de l'Institut Pasteur, August, 1915, xxix, p. 379.) This author has examined smears and cultures from tongue, cheeks, and gums of a number of individuals varying from new born infants to adults. As in all such studies, a large number of adventitious or accidental microbes have been encountered; thus the **Pneumococcus** was frequently encountered in the mouths of infants in hospitals, but was usually absent in children at home. These organisms, not essentially oral in their habitat, have been recognized and noted by the author as accidental visitants.

Her investigations have established certain important facts. The mouth at birth is sterile. From the 6th to 10th hours it begins to have a bacterial flora, recognizable at the 10th hour by direct microscopic examination. The first organisms found are various cocci (staphylococci, streptococci, the pigment-forming cocci of the air) and spore-bearing air bacteria. **From the first week until the appearance of dentition there is but one organism which may be considered constant, the Streptococcus salivarius. From the twelfth day it is the predominant species.**

With the appearance of teeth, the flora which was previously uniform thruout the mouth, changes; there are added certain other species which live by preference in the gingival crevice and interproximal spaces. These are the leptothrix threads, the spirochaetes, and certain anaerobic bacteria. They are constant and characteristic mouth bacteria, but their presence is to be explained not by any change in the constitution of the tissues of the mouth, but in the formation of spaces where food material may accumulate and putrefaction may occur; they are putrefactive bacteria. The flora of the adult mouth is practically the same as that of the infant after dentition. The **Streptococcus salivarius,** occurring as diplococci or short chains on the squamous epithelial cells, still forms the predominant species; on the cheeks it is practically the only organism, but on the tongue may be accompanied by some of the rods and spiral forms noted on the gums.

Recognizing the fallacy of the older investigations of the bacteriology of the mouth, Kligler has studied quantitatively, and apparently with some accuracy, the bacteria occurring on tooth surfaces and in cavities. By an ingenious technic the material removed was weighed and properly diluted. Counts were made both by direct observation thru the microscope and by plating on various media. In this manner, not only was the actual number of organisms present determined, but the infrequent and accidental forms were excluded, and the relative numbers of the different kinds of bacteria were made known. His studies yielded some very interesting results. The cases studied were divided into nine groups according to the condition of the mouth, starting with "Immunes" and passing thru increasing degrees of mouth dirtiness to advanced stages of caries. There was found, naturally, a progressive increase in the number of bacteria present from the first to the last groups. More interesting, however, were the findings in regard to the relative numbers of the various groups of organisms present. The streptococci, which form almost one-half of the organisms on the tooth surface in the healthy immune mouth, gradually decrease, and in caries are largely replaced by other forms, particularly the rods. It is to be pointed out that this decrease is only relative, and that if Kligler's percentages be converted into actual numbers there is found a very considerable increase of streptococci in the dirty and carious mouth. It is to be noted also, from his tables that, while the actual numbers of organisms in the dirty mouth is much greater than in the clean, the relative proportions of the various groups remains much the same. Caries alone, apparently, disturbs this relationship.

From a superficial examination of Kligler's data we are persuaded to believe streptococci are a negligible factor in caries, since they are relatively replaced on the decayed tooth surface by other bacteria, particularly acid-producing bacilli. Such, in fact, are his conclusions. Nevertheless, after a careful consideration of the data at hand, we are unable to concur in this opinion. We see in Kligler's figures merely a confirmation of the facts brought forth by Bräilovsky-Lounkevitch, namely, that when conditions of uncleanliness, and especially of decay, are present in the mouth, saprophytic bacteria tend to replace the

purely parasitic mouth streptococcus, capable of living on the clean, healthy mucous membrane. It may be that dead dentine forms the pabulum of choice for certain saprophytic mouth bacteria. Kligler also offers as evidence to support his view, the high acid-producing power of the bacilli isolated. But it is to be pointed out that mouth streptococci themselves are no mean competitors in this regard. Moreover, acid-production alone is not sufficient evidence that an organism is the cause of caries. It may well be that the final dissolution of dentine is due to acid-production by certain bacilli, but it must also be remembered that dentine is, while relatively inert, nevertheless a living tissue; it has its organic matrix in vital relation with the odontoblasts and nourished from the pulp. Being a vital tissue it is more or less resistant to infection; no satisfactory chemical or physical theory has as yet explained immunity to caries. And any organism, to be accepted as the cause of caries, must exhibit an ability to invade and overcome living tissues, qualities which, as we shall see later, are possessed, par excellence, by the streptococci.

We have already mentioned that there occur in dental infections only a few varieties of organisms which are present in sufficient numbers or with such constancy that they may be considered as possible etiological factors in these diseases. We propose next to consider individually these various organisms and to review the more important papers bearing upon their virulence, since a study of the pathogenic properties of the bacteria concerned is of prime importance in establishing their relationship to mouth infections. This property of virulence is itself made up of two more or less interdependent factors, the ability of the organisms to invade living tissues, and their power of forming toxines. Since none of the mouth bacteria concerned in dental infections produce, so far as is known, soluble toxines or very potent endotoxines, we may confine our observations to the invasive powers of the micro-organisms. Bacteria may invade the tissues locally. (microscopic and cultural studies of their presence in the deeper parts of the teeth and their investing tissues) or may invade the blood and lymph channels and produce lesions in distant parts (metastatic infections). We may also demonstrate the invasive powers of organisms by their ability to survive and multiply when experimentally inoculated into laboratory animals.

The organisms which we believe deserve consideration in this study are the fusiform bacilli, the mouth spirochaetes, the **Leptothrix buccalis,** the **Endamoeba buccalis,** the mouth staphylococci, and the streptococci. Of these, we hope to show that the last group alone, the streptococci, are the primary cause of the various dental infections; caries, pulpitis, alveolar abscess and pyorrhea.

Fusiform Bacilli. The spindle-shaped bacteria of the mouth first observed by Plaut and Vincent in a characteristic type of ulcerative tonsillitis have been considered by many to be specific organisms and the cause of that disease, commonly called Vincent's angina. It has since been shown, however, that they are normal inhabitants of the healthy mouth and that they may be associated with a wide variety of ulcerative and gangrenous processes in various parts of the body. They are, however, rather widely disfributed in nature and have been found in many of the lower animals.

Morphologically, the organism is characteristic. Its tapering pointed ends, and the presence of certain peculiar granules, staining deeply with those dyes that have an affinity for chromatin, permit of its immediate identification under the microscope. Certain discrepancies in the reports of various observers on the reaction to Gram's stain and the motility of these organisms seem to indicate that several species have been included under the name **Bacillus fusiformis,** and our own observations of forms found in pyor-

rhea pus have convinced us that there may be found here two distinct species, both spindle-shaped and containing nuclear granules, but differing in the following features: one (and this is the rarer of the two) is somewhat thicker, is Gram negative, possesses active motility, and has numerous peritrichic flagella, while the other is more slender, Gram positive, motionless, and tends to gather in clumps.

The fusiform bacillus may be cultivated anaerobically in media containing blood serum. It requires considerable time and patience to obtain a pure culture. In culture media the morphology changes somewhat, the organisms tending to grow out in longer filaments, and in older cultures and upon certain media there is a tendency to produce bizarre involution forms, the rods twisting up into spiral forms. In cultures there is produced a most disagreeable odor of putrefaction which is characteristic and is identical with the odor in the mouth noted in ulcerative and gangrenous processes; the same odor is frequently noted in opening old alveolar abscesses and gangrenous pulps.

The fusiform bacilli are almost invariably associated with certain spirochaetes. They are found in the healthy mouth in relatively small numbers, in the gingival crevices and interproximal spaces, and in the tonsilar crypts. They are always present in increased numbers in pyorrhea pus. They are particularly associated, however, with ulcerative and gangrenous processes.

They have been found in large numbers in certain types of ulcerative stomatitis, particularly gingivitis, and in the characteristic form of ulcerative tonsillitis mentioned above. They form a large part of the mixed flora of noma, or gangrenous stomatitis. They were first observed by Vincent in hospital gangrene a type of gangrenous wound infection seldom seen since the advent of asepsis. They occur in the lesions of the feet and legs known as tropical ulcer. In all of these conditions, however, the organisms are found in the superficial portions: the surface exudate, the dead tissues, or, at most, the very superficial part of the active process in the living tissue. In this respect, i. e., their inability to invade the tissues, they resemble the diphtheria bacillus, but differ in that they form no demonstrable toxine that may be absorbed and destroyed tissues. They never occur in these lesions in pure form, but are invariably associated with cocci, with spirochaetes, and usually thread forms. Moreover, they have frequently been found associated with ulcerative and gangrenous processes in which the cause is known; thus, we find them multiplying in tissues rendered gangrenous by interference with circulation, or by frostbite, in the ulcers of syphilitic and mercurial stomatitis and diphtheria.

Metastatic infections with fusiform bacilli are exceedingly rare, and if we exclude those cases in which other bacteria occurred in the metastatic abscesses, we have but six cases to record. Ghon and Mucha reported two cases of brain abscess secondary to bronchiectasis and gangrenous appendicitis respectively, in both of which there were found fusiform bacilli and long thread-like forms. The latter resembled the involution forms of fusiform bacilli observed in cultures. Kasper and Kern saw a similar case in which the same forms were noted in multiple abscesses secondary to appendicitis. The long threads, in their case, grew in cultures to look like the normal fusiform bacillus. Rosenow and Tunnicliffe had a very similar case. Frühwald noted fusiform bacilli alone in a brain abscess following a wound of the pharynx. Larson and Barron obtained a pure culture of fusiform bacilli from the blood, from a patient dying of ulcerative stomatitis and gangrenous inflammation of the superior maxilla.

These few cases alone do not furnish any proof of the pathogenicity of the fusiform bacilli. In all but two of them there

occurred long thread forms as well as the fusiform bacilli, which may or may not be involution forms. In all but one they occurred in patients weakened by the intoxication of an extensive gangrenous process. The other cases of metastatic infection in which fusiform bacilli were found have all shown other organisms as well, particularly pyogenic cocci, so that we cannot consider them as offering any evidence of the invasive properties of the bacilli. Most of them contained a great variety of organisms, indicating that the metastasis occurred by direct extension from one of the body surfaces, or that gross particles containing a number of bacteria were mechanically set free into the blood stream; they do not indicate any ability of the bacteria to invade the vascular channels. Such cases are those reported by Veszpermi, Costa, Silberschmidt, Feldman, Dick, and the second case of Kasper and Kern.

The direct inoculation of pure cultures of the **Bacillus fusiformis** into laboratory animals fails to produce any infection. It is true that Ellermann noted small local abscesses following subcutaneous inoculation into a guinea-pig, and Paul was able to produce a purulent peritonitis with one culture obtained from pyorrhea pus, but these observations stand alone in a large series of experiments carried on by many investigators in which sometimes very large doses were injected subcutaneously, intraperitoneally, intravenously, intraocularly, and intratesticularly into a variety of animals. The inoculation of pus from metastatic abscesses in which the fusiform bacillus alone was found has resulted negatively in those cases where such experiments were performed. On the other hand, the direct inoculation of pus, or material from the mouth, in which the organism occurred together with other bacteria, has yielded positive results in some cases. These experiments have been reported by Veszpremi, Silberschmidt, and Costa; the latter found that the fusiform bacilli survived in guinea-pigs after some weeks. Such experiments, however, cannot be offered as proof that the organisms are primarily virulent; they merely show that the fusiform bacillus can survive and multiply in pus and necrotic tissue produced by the pyogenic cocci in the original material.

Of dental lesions, the fusiform bacilli are found more constantly in pyorrhea than in other diseases. They prefer the gingival crevice, and are not numerous on tooth surfaces, even when the latter are filthy and loaded with bacteria. They are not prominent in caries and are not at all present, as far as we can learn, in the deep layers of carious dentine. They are frequently present in chronic alveolar abscesses, but are not constant. In pyorrhea pus, however, we have seldom found them absent, and they are usually present deep in the pockets. We have been unable to demonstrate their presence in the tissues in microscopic sections from pyorrhea.

Gins states that "The **Bacillus fusiformis,** as well as the spirochaetes, both apparently require a special preparation of the body tissues before they can multiply in them," and Ellermann arrives at similar conclusions; after noting that these organisms multiply to a considerable extent in diphtheria and other infections, the latter author states that the fusiform bacilli may in Vincent's angina and noma also live a purely saprophytic existence, acting as harmless commensals rather than active pathogenes. Aside from the very few cases of clear metastatic infection, there is no evidence that these bacteria are capable of producing disease. We are forced to conclude that they are mere camp followers, harmless putrefactive germs living on the tissues killed by other more virulent microörganisms. Therefore, they can play only a secondary role in the etiology of dental disease.

Mouth spirochaetes. Spiral organisms from the mouth are illustrated in our oldest bacteriological records (von Leeowenhoek) and have occupied a promi-

nent position in the writings of all who have devoted themselves to this branch of bacteriology. We must differentiate the rigid bacterial forms moving by means of flagella (spirilla) from the flexible forms moving by vibrations of the entire cell or by means of undulating membranes, and generally classed with the protozoa (spirochaeta). To the former class belongs the **Spirillum sputigenum** of Miller, cultivated by him aerobically on gelatine. The latter class has only recently been cultivated and requires anaerobic conditions and special media.

The variations in size and the number, depth, and regularity of the spirals indicate that several morphologically distinct species of spirochaetes occur in the mouth, and a large number of names for various forms are recorded in the literature. Hartmann and Mühlens, and Hoffmann and von Prowazek, independently divided the mouth spirochaetes into three species with distinct morphological characters and have to a considerable extent removed the confusion surrounding this group of micro-organisms. They recognize a **Spirochaeta buccalis,** the largest form with a few broad, flat spirals; a **Spirochaeta dentium,** the smallest form, with more numerous, narrower, and regular curves; and a **Spirochaeta media** exhibiting morphological characters intermediate between the other two. **S. buccalis** stains reddish with Giemsa's stain, while **S. dentium** takes a bluish tinge. Mühlens was able to obtain a pure culture of the smallest form in horse serum agar. Noguchi obtained pure cultures of the **Spirochaeta media** and **Spirochaeta dentium** and established firmly their morphological differences; he gave them new names, **Treponema macrodentium and Treponema microdentium,** thus separating them altogether from the larger, as yet uncultivated form, **Spirochaeta buccalis.** Noguchi later cultivated, from pyorrhea, another spirochaete that produced mucin and a fetid odor in cultures, which he names **Treponema mucosum.**

Mouth spirochaetes are found in the same areas in the mouth as the fusiform bacilli, except that they multiply to a greater extent on tooth surfaces and in the necrotic material of cavities. They increase in numbers in similar pathological condition, i. e., Vincent's angina, ulcerative stomatitis and noma and are constantly associated with the spindle-shaped bacteria in hospital gangrene and tropical ulcer. This constant association has led certain investigators to suggest that the fusiform bacilli and spirochaetes merely represent different morphological stages of development of the same organism (Plaut, and Wright), and Tunnicliffe has described spiral forms, found in old cultures of fusiform bacilli, which she believed indicated a transmutation of the two organisms; similar spiral forms were observed by Larson and Barron. Shmamine, however, showed that these were merely involution forms of the fusiform bacilli, and had nothing in common with the spirochaetes, while the subsequent pure cultivation of the latter finally proved that the relationship between the two microbes is purely symbiotic. Moreover, the occurrence of either form with exclusion of the other has been reported in ulcerative stomatitis (Ellermann) and in tropical ulcer (de Meyier), while the occurrence of fusiform bacilli in pure culture without spirochaetes in metastatic abscesses gives the final proof that the organisms are distinct. Their almost constant occurrence, together is to be explained by their similar biological characters, requiring anaerobic conditions and native serum for artificial cultivation, and increasing in the body in the presence of necrotic tissue.

Whether the spirochaetes associated with fusiform bacilli in ulcerative and gangrenous conditions are identical with those found in the normal mouth, and if so to which species they belong, is not altogether certain, but the balance of

evidence seems to indicate that the larger **Spirochaeta buccalis** is most frequently found in this symbiotic relationship.

While spirochaetes have been found to advance slightly beyond the fusiform bacilli in the border area between the gangrenous and healthy tissues in noma (Ellermann, Buday), in gangrene of the lung (Buday) and in tropical ulcer (Keysselitz and Mayer), we have been unable to demonstrate their presence in a few specimens of tissues from pyorrhea stained by Levaditi's method, nor have we been able to obtain any other evidence of their pathogenicity. No metastatic infections have been reported in which mouth spirochaetes have occurred alone, altho they frequently accompanied the fusiform bacilli in those cases to which we have already referred, where a multiplicity of bacterial forms were found in abscesses secondary to gangrenous processes. Moreover, the mouth spirochaetes in pure culture have proven non-pathogenic for laboratory animals. Mühlens obtained negative results from his inoculation experiments. Noguchi found his **Treponema macrodentium** would produce a temporary induration in the testicles of rabbits and supra-orbital tissues of monkeys; the organisms, however, failed to multiply in the indurated tissues. With his **Treponema mucosum** there was produced a small amount of pus in the testicle of a rabbit, in which the spirochaetes survived, if some agar (foreign body) was simultaneously introduced into the tissues. Paul cultivated both fusiform bacilli and spirochaetes in pure form from pyorrhea pus, but found that the fusiform bacilli alone would produce infection in guinea pigs. It is also to be noted that in those cases where positive results were obtained from the direct inoculation of pus containing fusiform bacilli and spirochaetes in symbiosis, the former alone survived in the resulting lesions (Costa). We must therefore conclude that the mouth spirochaetes are without pathogenic properties.

Leptothrix Buccalis. Those organisms growing in long threads form so conspicuous and easily recognized a portion of the mouth flora that in the early articles on this subject they received a great deal of attention. The name has been applied to a large number of organisms, and the confusion in the literature is almost hopeless. By various writers practically all of the mouth bacteria have been considered at one time or another to be some stage in the development, or mutation form, of this micro-organism. Miller clearly recognized this confusion and the many errors in the work of his predecessors, and stated, "As absolutely nothing was known concerning the biology and pathogenesis of this organism, all sorts of wonderful properties were ascribed to it. It is therefore high time to banish this confusing name from bacteriological writings."

Miller's work was published in 1890, and yet, while the thread forms fail to attract attention today as factors in the production of disease, there remains almost the same confusion in classification and nomenclature. We are to differentiate those larger thread forms which belong to the higher fungi, or moulds, and which are occasionally found in the mouth. The true thread fungi, or trichomycetes, are very slender filaments without articulations, altho they may show irregularities in staining. These are subdivided into genera according to the presence or abscence of branching. Branched forms are given the name Streptothrix and such forms are at times found in the mouth and have been cultivated and named **Streptothrix buccalis** by Goadby; they have also been studied by Kligler. No distinguishing characters are given by these authors, however, as means by which they can be differentiated from the similar forms so constant in air, dust, and soil, and the mouth forms may be merely accidental visitors from the air, like **B. subtilis** and **B. mesentericus.**

The term leptothrix should be applied

only to the non-articulated unbranched threads, and until further accurate information concerning the differentiation of these forms is available, it will be well to retain the name **Leptothrix buccalis** for such non-branching thread forms as are found in the mouth, keeping in mind, however, that the name probably includes a group of organisms and not an individual species.

Leptothrix forms are found in intertwining masses on tooth surfaces and invade the area of dead dentine in caries. They are found usually also in the gingival crevice and in pyorrhea pus. They multiply most, however, in the materia alba on the surface of teeth, and their tendency to form adherent masses has been considered of importance in forming those plaques on the surface of enamel beneath which caries is supposed by some to develop; Klebs saw, in these plaques, the nidus about which salivary calculus was deposited. While in the older literature many local and general disease conditions were ascribed to this organism, it has not been shown to invade the tissues of the mouth except when such tissues are dead. Thus it is found in large numbers in noma, and was considered by Perthes to be an etiological factor in that disease; invasion of the living border of tissue has not, however, been demonstrated. While leptothrix forms have been found in some cases of endocarditis, in rat-bite fever, and in the urine in certain cases of kidney disease, identity of these organisms with the thread-bacteria of the mouth has not been established, and, save for the instances to be cited below, we can find no records of metastatic infection with **Leptothrix buccalis.** The organism has been grown in pure culture by Kligler, who reports no animal experiments. Wherry and Oliver also claim to have cultivated this organism, but likewise failed to inoculate animals. Thus it will be seen that the **Leptothrix buccalis** has not been proven to have any pathogenic properties.

There remains to describe a peculiar symbiotic relationship frequently entered into between certain fusiform bacilli and leptothrix threads. We frequently find on tooth surfaces and in pyorrhea pus, and occasionally in apical abscesses, small granules within the limits of visibility by the naked eye, which under the low power lens of the microscope are seen to be composed of radiating filaments with swollen extremities which bear a remarkable resemblance to the ray-fungi of actinomycosis. Such granules are also frequently found in the crypts of the tonsils. On finer examination, however, we note that these granules are composed of leptothrix threads to which there are mechanically adherent large masses of fusiform bacilli, especially at the extremity of the threads, thus producing the swollen "clubs" at the periphery of the granules. The structure of these granules has been demonstrated by von Beust, Veszpremi, and Davis, who have shown that these granules have nothing in common with **Actinomyces.** In the case reported by Veszpremi, these granules were found also in the brain abscess which developed by extension from the necrotic process in the jaw, and this is the only record we have of the occurrence of mouth leptothrix threads in metastatic infections, while here they did not occur alone.

The numerous reports in the literature of the occurrence of **Actinomyces,** without actinomycosis, in the crypts of the tonsils (Johne, Volkman, Wright, Lord) and in decayed teeth and alveolar abscesses (Volkman, Lord, Zilz, Partsch, and Thoma) lead one to believe that these granules have repeatedly been mistaken for the true ray fungus. This peculiar attachment of fusiform bacilli to leptothrix threads also probably formed the "fruitful heads" of the **Leptothrix Racemosus** of Vincentini to which he ascribed such wonderful properties.

Endameba Buccalis. An etiological relationship between this protozoan parasite and pyorrhea, suggested by Barrett and Smith, was more positively claimed

by Bass and Johns. We have previously given, in the pages of this journal, reasons why we believe the mouth ameba are not pathogenic. Those reasons are, briefly: that the organism is present frequently in healthy mouths; that it does not invade the tissues; that its presence in pyorrhea pus in increased numbers can best be explained by the fact that here it obtains its favorite food, pus cells and certain bacteria; and, finally, that the administration of emetine, while it frequently destroys the endameba, fails to stop the disease process. These statements are still valid. We wish to emphasize that, unlike the endameba histolytica in dysentery, the mouth ameba cannot be found in sections of the tissues of pyorrhea, and have never been demonstrated in metastatic infections, altho Evans, Middleton, and Smith have suggested a possible relationship to thyroid disease.

Since the enthusiastic publications of Bass and Johns, there have appeared a number of other studies of the **Endameba buccalis.** Craig reviewed the morphology of the organism more thoroly than had been done before and described its life history; he failed to find any evidences of pathogenicity. Williams, Von Sholly, Rosenberg, and Mann, of the New York City Department of Health, examined a large number of children and found the ameba in 29% of cases with healthy gums, in 37% with healthy gums and decayed teeth, in 65% with tartar and receding gums, and in 91% with spongy, bleeding gums. These figures were closely paralleled by those of Mitchell. Culpepper, and Ayers at Syracuse. The latter observers found the ameba more numerous in superficial smears. Sanford found the organism present in 14% of health mouths; he pointed out, as did Craig, that there is no parallelism, either clinically or morphologically, between **Endameba buccalis** and **E. histolytica,** and stated, as did Craig also, that there is no proof that emetine always kills ameba in the mouth. Sanford failed in an attempt to transfer the ameba to lower animals.

Barrett and Smith claimed to have partially succeeded in cultivating the **Endameba buccalis,** but Craig pointed out that their "reproduction by budding" was an evidence of degeneration. Wherry also claimed to have grown the ameba on agar made from Martin's broth, but his evidence is not convincing. No animal experiments are reported, nor were pure cultures obtained. Hecker, by an ingenious modification of the Barber pipette succeeded in picking up a number of the ameba from pyorrhea pus, and after freeing them of bacteria with a finer pipette, introduced them into the gingival crevices of guinea pigs, and himself, without infection taking place.

We have, then, no trustworthy evidence that the mouth ameba are capable of producing disease; and this statement is equally applicable to the other large protozoa of the mouth, the more actively motile Endameba Kartulisi, and the **Trichomonas buccalis** which has recently been studied morphologically and cultivated by Noguchi.

Staphylococci. The staphylococci of the mouth were first studied by Biondi. Injecting saliva subcutaneously into guinea pigs, this author frequently found that abscesses developed from which the **Staphylococcus pyogenes aureus** or **albus** could be cultivated; he also described another form which he named **Staphylococcus salivarius pyogenes,** differing from the others only in its small size. Staphylococci received but scant attention from the earlier writers on mouth bacteria. Black found the aureus variety seven times, and albus four times, out of ten healthy mouths. But Miller, Netter, and Vignal found them rarely. Goadby cultivated **S. p. aureus** 80 times from 1000 mouths, but found **S. p. albus** quite frequently, in the majority of the suppurative conditions of the mouth. He notes that in its slow rate of liquefaction of gelatine, and its low pathogenicity, the white staphylococcus of the

mouth resembles the sub-variety known as Staphylococcus epidermidis albus. Kligler studied 29 strains of staphylococci, and found but two of the golden variety; of the twenty-seven white strains, twenty-one failed to liquify gelatine. Our own observations, in general, confirm those of Goadby and Kliger, that the **Staphylococcus aureus** is rare, and is to be considered accidental. The variety most commonly found is the non-liquefying white staphylococcus, generally considered non pathogenic.

The question of pathogenicity of mouth staphylococci needs considerable further study. As evidences of local invasive qualities, we note that they were found constantly in the deepest layers of carious dentine by Goadby and Kantorowicz. The latter author found **S. p. aureus** only once, and the majority of his **albus** strains were non-liquefiers. Staphylococci have been most frequently associated with the so-called suppurative processes, pyorrhea alveolaris and chronic alveolar abscess. Staphylococci, when they are pathogenic, are pus producers. But, as will be shown in a later paper, pyorrhea and chronic alveolar abscess are not primarily purulent infections at all; suppuration occurs as a secondary manifestation, and, in the case of the latter of the two diseases mentioned, is frequently lacking altogether. We have found staphylococci most frequently in pyorrhea, where suppuration occurs constantly; but in those cases where we have carefully cleansed and cauterized the pockets, and made our cultures from the deep tissues curetted out, we have frequently obtained pure cultures of the more contant streptococcus. We feel, therefore, that in pyorrhea the staphylococci are secondary and but superficial invaders, probably responsible for the suppuration. In chronic alveolar abscess, which is really a granulomatous process, we do not have the tissues exposed to the mouth cavity as in pyorrhea, and secondary suppuration occurs less frequently. We have not found staphylococci very often in apical lesions; unfortunately, we have not kept record of the number of times they have been found, but it is not more than ten per cent. Staphylococci occur usually where there is pus in the granuloma.

We have at hand no data concerning the occurrence of metastatic staphylococcus infections secondary to dental lesions. That they occur is granted; their rarity is indicated by the paucity of the literature on the subject. Animal inoculations have at times been successful. Biondi's results have been confirmed by others; that is, when saliva or mixed cultures from the mouth are injected into animals, abscesses containing staphylococci sometimes develop. We have found some of our strains pathogenic, but not constantly nor even frequently. Further study of this problem is indicated.

To sum up, the staphylococci of the mouth belong to the non-liquifying white variety generally considered non-pathogenic. They are found at times in dental and peridental infections, but not constantly, and show only a slight local invasive power; they are perhaps responsible for secondary suppuration in these lesions. Their pathogenicity is doubtful.

Streptococci. The earlier investigators of mouth bacteria were handicapped by the lack of modern methods of cultivating and identifying bacteria, particularly in that gelatine was used for isolating cultures, requiring incubation at room temperature. It is not surprising, then, that most of them failed to observe the most numerous, constant, and important group of mouth bacteria, the streptococci. Biondi, in his experiments with direct inoculation of saliva into animals, found a streptococcus which he considered identical with the variety that causes erysipelas and abscesses, which he named **"Streptococcus septo-pyaemicus.** Black described several varieties of streptococci in the mouth, **"Streptococcus pyogenes,"** for instance, in three out of ten samples. Netter obtained this or-

ganism in 5% of his cases, but Miller found it only once, and Vignal never.

Von Lingelsheim first offered a basis for classification of streptococci, and pointed out that the salivary streptococci differ from the forms found in abscesses and erysipelas, generally called **Streptococcus pyogenes,** in that they tend to form short chains, produce cloudiness in broth, grow on potato, and are non-pathogenic for mice. For these short-chained forms found in the mouth he proposed the name **"Streptococcus brevis,"** calling the pus-producing form **"Streptococcus longus."** It has since been shown repeatedly that the length of the chains is not constant nor a criterion of virulence, but in a general way von Lingelsheim's classification is correct, and he called attention to the large group of relatively non-pathogenic mouth bacteria. Goadby was struck by the **constant** presence of streptococci in the mouth. He states that "In all mouths, clean or dirty, I have never failed to obtain the Streptococcus." This fact, so easily demonstrated, is not as widely known as it should be, and is not readily accepted by those who have had little experience in studying the mouth flora. It should be pointed out that the finding of streptococci in cultures from any part of the mouth surface is without significance as far as disease is concerned, since such streptococci are **always** present in all parts of the mouth in enormous numbers, from shortly after birth thruout life. Goadby further described accurately the morphological and cultural characters of the mouth streptococci. He called attention to the fact that in the mouth they occur normally as diplococci. growing in pairs and not in chains. In this situation they are found adherent in large numbers to the squamous epithelial cells, or free on tooth surfaces. In culture media they tend to grow out into chains, usually short, but may remain as diplococci for some time; frequently they form chains of pairs. They show a marked tendency to become elongated in the axis of the chain. Goadby identified the mouth streptococci with the **"Streptococcus brevis"** of von Lingelsheim, also observing that it was not pathogenic for laboratory animals.

An approach to a more accurate differentiation of streptococci was begun by Gordon; in an attempt to establish the identity of mouth streptococci with those found in the air, he applied to this group of organisms the carbohydrate-fermentation tests that had proven so successful in differentiating the colon-typhoid bacilli. This work was continued and extended to other streptococci by himself, Houston, and Andrewes and Horder. The latter authors developed a working classification that is still acceptable. Among other forms they recognize l a **Streptococcus salivarius,** characteristic of human mouth, which could be differentiated by its fermentation of certain sugars. Another step forward in the classification of streptococci was made by Schottmüller, who found that this group could be sharply divided into two by the use of blood agar; one sub-group dissolving the blood and producing a clear halo around the colonies, he called **"Streptococcus longus"** after von Lingelsheim, while the other sub-group was named, **"Streptococcus viridans"** since it failed to hemolyze, but produced a greenish zone.

We need not go further into the literature on the classification of streptococci; this has been dealt with more thoroly in previous papers from this laboratory. Suffice it to say that it was ultimately proven that the **streptococcus brevis** of von Lingelsheim, the **Streptococcus salivarius** of Andrewes and Horder, and the **Streptococcus viridans** of Schottmüller are one and the same organism, and are identical with the **"Diplococcus rheumaticus"** of Poynton and Paine. There has arisen some confusion in the literature due to the failure of various observers to differentiate accurately cultures from dental lesions, and we believe that it would be profitable to point out here the

means by which the mouth streptococcus may be differentiated from other forms. The tendency to grow in pairs of somewhat elongated cocci has led to confusion with the Pneumococcus; it differs from the latter in its failure to produce capsules in inoculated animals, its failure to ferment inulin, and its insolubility in bile and bile salts. Differentiation from the more pathogenic **Streptococcus pyogenes** should be made by observation of blood agar cultures. While the mouth streptococci regularly fail to hemolyze blood and usually produce green colonies when the proper technic has been followed, it should be recognized that if very thin blood agar is used, or if the cultures be observed when several days old, the colonies will frequently be found to have a very narrow zone of hemolysis. We feel that this has been a source of error in the frequent reports of finding hemolytic streptococci in chronic alveolar abscess which we have been unable to confirm. We recommend, for sharp differentiation, the use of 20 drops of rabbit's blood in ten c. c. of agar and observation at the end of twenty-four hours. We also wish to call attention to the fact that non-hemolytic streptococci are found constantly in other parts of the body; that there occurs normally in the intestines a variety of **Streptococcus viridans,** called **Streptococcus fecalis** by Andrewes and Horder, which is differentiated from the mouth streptococcus by its ability to ferment mannite.

Are mouth streptococci a distinct species, or are they but a variation of the ordinary **streptococcus pyogenes?** Is there but one streptococcus which is highly variable, or are there numerous species? This is one of the most hotly debated topics in bacteriology, and we must admit is still unsettled. We believe that the balance of evidence at present is in favor of the view that there are a number of species of streptococci, distinct and not transmutable, of which the **Streptococcus salivarius** is one; certainly the division into hemolytic and non-hemolytic strains is, in our opinion, inviolable. The most radical opinion opposed to this theory is that of Rosenow, who believes that **Streptococcus viridans** may change into **Streptococcus pyogenes** on the one hand, and the **Pneumococcus** on the other. This theory has led to the wildest speculations as to the possible dangers of focal streptococcus infections. We wish to call attention to the fact that Rosenow's experiments have not, so far as we know, been confirmed by any other bacteriologist; that one author at least, Holman, has repeated those experiments without confirming them, and has pointed out the probable sources of error in Rosenow's work.

The pathogenicity of mouth streptococci is a very broad topic, and has been considered to some extent by us in previous papers. We wish to discuss here particularly the primary invasive qualities of the organism and its etiological role in the principal dental diseases. For this purpose we have gathered together several of the more recent papers on the bacteriology of caries, pulpitis, alveolar abscess, and pyorrhea. It would take us too far afield to review all of the literature bearing on these problems, and the older literature, particularly, is useless. As Kantorowicz stated in the introduction to his studies of caries, the older writers, (Miller, Vignal, Galippe, etc.) dealt only with the putrefactive bacteria living on the surface of the carious dentine, and failed altogether to observe the organisms characteristic of caries present in the depths of the diseased tooth substance. Moreover, using gelatine for isolation, they failed to get a growth of the more parasitic forms that grow only at body temperature. This criticism is equally applicable to the early studies of the other dental lesions, particularly pyorrhea. These papers, however, have greatly confused the study of dental bacteriology and have given rise to the erroneous impression that infections of the teeth and their investing tissues are al-

ways hopelessly mixed infections, and that since so many kinds of bacteria are present, no particular one can be considered the etiological agent. As a matter of fact, all of the later students who have attacked these problems rationally by developing a technic whereby surface organisms are excluded and only those bacteria deep in the advancing border of the diseased tissues are retained, have come to the same conclusion, namely, that the deeper you go into the tissues the more simple and uniform does the flora become, until ultimately streptococci alone remain.

This newer conception of dental bacteriology had its beginnings in the work of Sieberth on pulpitus. Previously it had been claimed by Arkövy that pulpitis was due to an organism named by him the **Bacillus gangrenae pulpae,** and the same organism was found by his pupil, Dobyzyniecki, in caries and alveolar abscess; but it was later shown by various workers that this organism was merely the common spore-bearing aerobe, **Bacillus mesentericus,** that had contaminated his cultures; this is but an example of a large number of studies of dental bacteriology whose authors lacked sufficient training in general bacteriology to interpret properly their findings. Sieberth chose teeth with dead pulps that were not sufficiently exposed by decay to be contaminated by the surface bacteria of the mouth, and, after cleansing the surface with disinfectants, cracked them open with sterile instruments. Cultures were taken from the pulp so exposed, and spread on agar plates. He relates his great astonishment at finding on these plates not the great variety of colonies of different kinds of organisms that he had been led to expect from the writings of previous workers, but only myriads of tiny gray colonies of streptococci. Only occasionally were other (contaminating) organisms encountered, and he justly concludes that streptococci alone are concerned in the devitalization of the pulp. Sieberth worked before the modern methods of differentiating streptococci had been developed, and altho he gave minute morphological and cultural descriptions and divided his strains into a number of groups, we are unable to determine whether or not they are the true salivary streptococci. Some strains were pathogenic for mice.

Goadby first separated the bacteria of caries into two groups, superficial and deep, and simplified the problem by showing that in the deep layers, only a few varieties of organisms were present. By alternately cauterizing and excavating the surfaces of the cavities, he came ultimately to the deepest layer of carious dentine, and cultures from this area yielded only three organisms, a streptococcus (**Streptococcus brevis**), **Staphylococcus albus,** and a Gram positive bacillus which he named **Bacillus necrodentalis.** Kantorowicz attacked the problem in the same manner and completely confirmed Goadby's findings. He found two types of streptococci, one at times pathogenic for mice. Both showed the morphological characters of **Streptococcus viridans,** i. e., growth in pairs and a tendency to become elongated. Two out of 14 strains were hemolytic, but the author does not believe that hemolysis is a satisfactory basis for classification. The streptococci were the most numerous. The staphylococci were always present in small numbers; they belonged to the non-pathologenic, non-liquefying white variety. The **Bacillus necrodentalis** apparently belongs to the lactic acid group of bacteria; it proved pathogenic for mice.

Similar, and even more striking, results were obtained by Niedergesäss, and published in a more recent article. In the deeper layers of carious dentine, streptococci alone were found, excepting in two cases where the **Staphylococcus aureus** grew. Of twenty-three strains of streptococci isolated, twenty he classified as **Streptococcus pyogenes,** since they formed long chains and hemolytic colonies on blood agar plates, while the

individual cells were round; three strains he identified with the **Streptococcus acidi lactici** of Kruse, since they formed short chains, did not dissolve blood, and had elongated or oval cells. (It has been shown by various authors that the streptococci responsible for the normal souring of milk have the general properties of the group we designate as **Streptococcus viridans.**) Very few of his strains exhibited any pathogenicity for mice, and then only to a slight degree. The author also studied further the acid production of these streptococci in carbohydrate media, and in a comparative study showed that the streptococci produced as much acid as the other organisms in the outer layers of the carious dentine, and frequently more.

We must believe, then, that streptococci are the microbic agents that cause dental caries, whatever other factors may enter into the etiology. The fact that they are the sole organisms found constantly in the advancing border of the carious process indicates that they possess an **invasive power** not exhibited by the other bacteria found in cavities. It may be that the solution of the lime salts is accomplished by acids formed from other bacteria, altho mouth streptococci are powerful acid formers; it is quite certain that the digestion of the organic matrix is accomplished by the proteolytic activities of such saprophytes as **B. proteus, B. mesentericus,** and certain of the anaerobic bacilli. But these processes are secondary. The penetration and necrosis of the dental tissue, seen in the advancing border of the process, is very evidently due to the streptococci, and the streptococci alone.

Since a chronic alveolar abscess is usually consecutive to pulpitis produced by caries, it is reasonable to expect that here too, streptococci will be found the most important organism, and such, in fact, is the case. It is not easy to obtain cultures from deep in the jaw without contamination from the surface of the mouth, and such contamination is evident in most of the literature on this subject, which describes a great variety of organisms; most stress has been laid, however, on the pyogenic cocci, particularly staphylococci. Preceding our own studies on the bacteriology of chronic alveolar abscess, the only investigators who obtained similar results were Mayrhofer*, and Gilmer and Moody. The former author found streptococci in 47 of 50 cultures, in 30 cases in pure cultures, in others together with staphylococci and bacilli. He believes that the staphylococci are secondary invaders, and that the bacilli are without pathogenic action. Gilmer and Moody found the streptococci to be the most numerous organisms, but found other cocci and fusiform bacilli as well; they studied both acute and chronic abscesses and found hemolytic streptococci as well as the **Streptoccccus viridans.**

Our own studies, published in previous papers, indicate that the **Streptococcus viridans** is the only organism found **constantly** in **chronic** alveolar abscesses, and in the great majority of cases is found in pure culture. Like the authors just quoted, we have at times found other organisms, particularly the white staphylococci and fusiform bacilli, but we believe that these are secondary invaders and practically devoid of pathogenic action. From acute abscesses we have recovered hemolytic streptococci on one or two occasions, but the majority of our cultures, from lesions where free pus occurred, have yielded staphylococci (also hemolytic at times) and the fact that these staphylococci have usually been found associated with the mouth streptococci, together with histological findings in the affected tissues, lead us to believe that many of the acute abscesses indicate a secondary invasion by staphylococci with a suppurative process implanted upon the primarily granulomatous lesion. Occasionally purulent infec-

*We have just recently become acquainted with Mayrhofer's work, and for that reason have not quoted it in our previous papers.

tions are found where other organisms are apparently the etiological factor, such as the **Pneumococcus,** diphtheroid bacilli, **Bacillus pyocyaneus, Bacillus fecalis alkaligenes,** etc.; such infections are not, common, nor can they be considered characteristic dental lesions.

The literature on the bacteriology of pyorrhea is in hopeless confusion. All of the previous investigators, as far as we can determine, have dealt with the organisms in the free pus found in pockets, or even on the surface, and naturally they have obtained all of the organisms that occur in the mouth. Such studies are worthless as evidence for the etiological relationship of the organisms to the disease. We have followed a more rational technic. By thoroly cleansing the surface of gum and tooth, drying the area so cleansed and packing it off with dry sponges; by painting the area with iodine; by burning with the actual cautery the superficial tissues of the pocket; and then, having sterilized the field and removed the superficial layers of tissue with their surface bacteria, we have made cultures from the deep tissues and have usually obtained pure cultures of streptococci. That is, we have applied to the peridental membrane the principle involved in the technic which Kantorowicz and Niedergesäss used in studying the bacteriology of the dentine, and we have arrived at similar results and conclusions. The organisms found in the advancing border of the active disease process in pyorrhea alveolaris are streptococci; other organisms are found, staphylococci and occasional bacilli (especially fusiform bacilli) as in caries and in alveolar abscess, but they are not constant, and play a secondary role.

Whence come these streptococci, and how do they arrive at the tissues which they infect? In pyorrhea and caries the process begins so manifestly on the mouth surface that there is no question but that the organisms penetrate the tissues from the mouth. Pulpitis and alveolar abscess are usually secondary to caries, and may be considered in the majority of cases an extension of the same process. But the frequent occurrence of abscesses at the roots of artificially devitalized teeth, even where proper antiseptic measures have been used, and the finding of gangrenous pulps and abscesses in non-carious, apparently sound teeth, together with the occurrence of abscesses at the apices of entirely vital teeth has given rise to the view that many, if not all alveolar abscesses are produced by hematogenous infections. This theory, by no means new, was revived and exploited to a considerable extent recently in connection with the widespread interest in the focal infection theory. Under the influence of Rosenow's teachings concerning the mutation of streptococci and their elective localization, Ulrich, particularly, advanced the theory that "blind" abscesses result from the localization of streptococci that have invaded the blood stream, at a "locus minoris resistentiae" produced by the devitalization of the tooth; and Rosenow has published some remarkable experiments that seem to indicate that streptococci in diseased pulps actually develop an affinity for that tissue. While it is not within the scope of our paper to enter into a discussion of root canal treatment or the possible dangers of devitalization, it is necessary to the development of our thesis to show that dental infections are the result of direct invasion of the teeth or their investing tissues by streptococci from the mouth. We shall therefore digress a little to offer reasons why we believe the hematogenous theory is untenable. We cannot readily believe that the blood stream is frequently invaded by streptococci with no other symptoms or lesions than a dental abscess; yet probably the majority of persons who carry blind abscesses have no other evidences of a streptococcus infection. Not all devitalized teeth

develop abscesses; Ulrich's figures, which are the highest we have seen, claim 70%. Granted that a perfect aseptic technic has been observed in the devitalization, and that the root canal has been thoroly disinfected, there yet remain other channels for reinfection than the blood stream, which we believe can be more rationally considered the true portals of entry for the streptococci. In the first place, Niedergesäss has shown that in many teeth there occur microscopic clefts in the dentine, thru which organisms from the mouth can pass directly into the pulp chamber, without caries; these may explain cases of pulpitis without caries. Secondly, Mayrhofer has shown that in pulpitis there occurs an invasion of the dentinal tubules, especially at the apex, and that within two weeks after disinfection and filling of the root canal, cultures from the pulp chamber will again yield streptococci; this type of reinfection, we believe, deserves serious consideration. Finally, we believe that the lymphatic system of the alveolar process is an important factor. We have repeatedly found that cultures from periapical tissues of healthy teeth two or even three teeth removed from an abscess yielded streptococci, and this can only be explained as a spreading of the infection thru the regional lymphatics. Such an invasion by way of the lymphatics must also take place frequently from the tissues about the gingival crevice, passing directly down the peridental membrane; we have found areas of gingivitis and alveolar periostitis in microscopic sections which were not at all visible grossly, which could well serve as foci of lymphatic distribution to deeper parts of the peridental membrane. Such lymphatic invasion will explain abscesses on vital teeth.

It is unfortunate that those investigators who have preceded us in the study of streptococci in dental lesions have failed to observe accurately those qualities by which streptococci are now classified, namely, hemolysis and carbohydrate fermentations. Siebert and Mayrhofer offer nothing in this line. Goadby identified the streptococci of caries with the normal mouth streptococcus (which he calls **Streptococcus brevis**) by morphological and general cultural characters. Kantorowicz made no classification, but his morphological descriptions together with the fact that twelve out of fourteen strains were non-hemolytic indicate that he, too, was dealing with the same kinds of streptococci as are found in the normal mouth. Niedergesäss, alone, found a predominance of long chained hemolytic streptococci. We have studied both hemolysis and carbohydrate fermentations with a long series of strains from pyorrhea and alveolar abscess, and have found that, with one or two exceptions, all the streptococci from these lesions are identical with the normal mouth streptococcus, the **Streptococcus salivarius** of Andrewes and Horder. This, we believe, is the strongest evidence that the streptococci in dental lesions come directly from the mouth, and not from a distance by way of the blood stream.

We have thus shown that streptococci alone are found constantly in the deepest layers of diseased tissue in caries, pulpitis, chronic alveolar abscess, and pyorrhea, the common infectious diseases of the teeth and their investing tissues, or, otherwise stated, the streptococci show locally in the mouth greater invasive power (pathogenicity) than any of the other mouth bacteria that have been associated with the diseases mentioned.

It is not necessary for us to quote extensively from the literature on metastatic infections produced by mouth streptococci. The identification of the **Streptococcus salivarius** with the **Diplococcus rheumaticus** of Poynton and Paine and with the **Streptococcus viridans** of Schottmüller has definitely associated this organism with the various lesions that go to make up acute and chronic

rheumatism, particularly **endocarditis.*** The frequency with which these lesions occur in man is evidence that the mouth streptococci exhibit an ability to invade the blood stream equal to the **Streptococcus pyogenes,** and not shown by any of the other mouth bacteria. Unlike the **Streptococcus pyogenes,** the members of the viridans group are unable to maintain a continued existence in the blood, and seldom produce septicemia, but tend rapidly to localize. The focal lesions in the tissues, produced by these streptococci, are moreover, seldom purulent in character; instead of producing acute inflammations with abscess formation, as does the **Streptococcus pyogenes,** the mouth streptococci produce in focal lesions a subacute or proliferative type of inflammation with lymphocytes and plasma cells, or endothelial cells and fibroblasts as the principal cells of the exudate, rather than pus cells. That is, while the mouth streptococci show an invasive power equal to the hemolytic forms, they do not form so potent a toxine, and are therefore less virulent. We wish to emphasize the inability of the Streptococcus viridans to produce pus in the human body, and to offer this fact as further evidence to prove that this organism is primarily responsible for the infections of the peridental membrane, since it has been shown by various pathologists, particularly in Germany, that neither pyorrhea nor chronic alveolar abscess are primarily suppurative, but are granulomatous in character, and that in both of these diseases plasma cells and lymphocytes are the principle inflammatory cells.

We need not, either, devote much space to the question of animal inoculation experiments. We have reviewed the literature and presented the results of our own experiments in previous papers. Such experiments have been performed so often by so many different investigators that there can remain no doubt that mouth streptococci, when injected into rabbits, show a degree of pathogenicity not equalled by any of the other common mouth bacteria. In our first reports we showed that mouth streptococci are capable of producing in rabbits lesions identical with those produced by strains of **Streptococcus viridans** obtained from the lesions of rheumatism and endocarditis. In a later report we determined more accurately the degree of pathogenicity which **Streptococcus viridans** (particularly the mouth strains) exhibits for rabbits, and compared their virulence with that of the hemolytic **Streptococcus pyogenes.**

Fortunately, the period of exploitation of the focal infection theory is about over; the dental profession has awakened to new responsibilities and new opportunities, while the medical profession is beginning to rediscover the fact that there are other causes of disease and other portals of infection than the dental abscess. There are still rife, however, many speculations and unproven theories as to the possible dangers of peridental infections and their ability to produce a wide variety of systemic diseases. We feel, therefore, that we should state here our opinion upon this subject. We have noted several cases where mouth streptococci from dental abscesses have invaded the lymph glands of the neck and have produced a chronic non-suppurative lymphadenitis, with cellulitis in one case, and two cases where strains of high virulence invaded the blood stream and produced death from septicemia; but aside from these non-specific types of infection which may at times be produced by any organism, we do not believe that mouth streptococci have been proven to cause any other systemic disease than the various lesions that go to make up the disease known as rheumatism, and we believe the dental lesions are more particularly the source of the

*The studies of Poynton and Paine, and others, have established that most forms of heart disease are a part of the rheumatic process, and they are so considered by us.

chronic progressive forms of this disease. We have been misinterpreted by various people as claiming that streptococci from dental abscesses in patients suffering from rheumatism show a specific tendency to produce rheumatic lesions in rabbits not exhibited by mouth streptococci from other individuals. We have, however, not made any such statement, and, as a matter of fact, have found all mouth streptococci, whether from diseased individual or normal, showing a tendency to produce rheumatic lesions in rabbits. We have stated that streptococci from dental abscesses are more pathogenic than those from normal saliva, which is of course to be expected.

We are unable to accept, in any degree, Rosenow's elective localization theory. We have seen no evidence in our own experiments to confirm it, altho it is but fair to state that we have not used his technic, feeling that, particularly in the inoculation of rabbits with enormous doses of **mixed cultures,** it is not good bacteriological practice. Moody, however, has studied this question very thoroly, working with streptococci from dental abscesses and using essentially Rosenow's technic; cultures were obtained from dental abscesses in 15 patients with articular rheumatism, 15 patients with other forms of systemic disease, and 19 patients healthy save for their mouth infections, and in all 178 rabbits were inoculated. The percentages of lesions in the various tissues of the rabbits are compared and tabulated. He concludes that "the lesions produced by organisms from persons without systemic disease are identical in character with those produced by organisms from patients with systemic infections. The fact that the former do not produce lesions quite as frequently as the latter indicates a difference between the organisms only in degree of virulence," and further that "the localization of **Streptococcus viridans** cannot be determined wholly by some property inherent in the organism itself."

We wish to call attention to the fact that members of the **Streptococcus viridans** group are normally present thruout the gastro-intestinal tract as well as in the mouth. Failure to recognize this fact has led to two sorts of errors in the focal infection theory. Firstly, the fact has been overlooked that **Streptococcus viridans** may invade the blood stream from the intestines as well as from the mouth, and the presence of **Streptococcus fecalis** (mannite fermenting) in a goodly number of cases of endocarditis indicates that infections from this source do frequently occur; that is, focal lesions of the intestines must be considered as well as lesions about the teeth and tonsils in trying to find the source of infection in systemic diseases. Secondly, the finding of **Streptococcus viridans** in ulcerative lesions of the gastro intestinal tract (gastric ulcer, cholecystitis, appendicitis) has given rise to the theory that such lesions are produced by a localization of streptococci from focal infections in the mouth which have invaded the blood stream, whereas such streptococci are normally present on the mucous surfaces in question; and the failure of the investigators of these diseases to differentiate the streptococci found, both in clinical observation and in animal experiment, by carbohydrate fermentation tests, leaves one in doubt as to whether these streptococci had actually come from the blood stream or had been originally present on the surfaces of the ulcerated mucous membrane.

How dangerous are dental abscesses to the general health? These lesions become definitely encapsulated by scar tissue, and frequently undergo spontaneous healing, while the streptococci that cause them are of very low virulence. Nevertheless, the fact that these abscesses remain unhealed or slowly progressive over a long time indicates that the balance between virulence of organism and resistance of host is very delicately maintained, and may be disturbed

in favor of the streptococci by very slight influences. While the organisms are of low virulence, this is due to the low grade character of their toxines and not to any lack of ability to invade tissues. Moreover, they show a great tenacity, being able to maintain an existence in the body for some time after invasion. We believe that the streptococci produce no immunity, but tend rather to break down the normal resistance. This is indicated both by the generally admitted failure of vaccine therapy, and by the fact that infections are usually followed by repeated recurrences of increasing severity.

We stated at the beginning of this paper that since dental infections are produced by organisms normally present in the mouth, there must be other factors in the etiology of these diseases than the mere presence of bacteria, factors which break down the resistance of the tissues and allow the organisms to invade. We may now apply this statement more specifically to the streptococci. Some of these factors are well defined from clinical observation. They may be general in character, like mercurial (and possibly phosphorous) poisoning, and scurvy, diabetes and pernicious anemia; or local, as mechanical injury, accumulations of tartar, etc. We cannot reproduce dental infection by merely introducing streptococci into the mouths of animals, or even by inoculating them into the peridental tissues; but we can experimentally reproduce some of the conditions that lead to dental infections. Jackson and Moody have shown that, by altering the diet of guinea pigs, experimental scurvy may be produced, and that, in the mouth lesions as well as the internal lesions of the animals so diseased, the **Streptococcus viridans** is found. We have found that by feeding cats with calomel we can produce an experimental mercurial stomatitis, with loosening of the teeth and the formation of abscesses in the jaw, and from the depths of the lesions so produced, as well as from the cervical lymph nodes, we have isolated streptococci. (The mouth flora of cats is very similar to that of man.) By cutting off the crowns of teeth in cats and exposing the pulp to the saliva, we have produced alveolar abscesses which contained streptococci in pure culture; and by placing wire ligatures about the necks of the teeth and so irritating the gingival tissues, we have produced a typical pyorrhea. We believe that a great deal concerning the etiology and pathogenesis of dental infections, as well as their role in the production of systemic disease may be learned from a large series of such experiments.

SUMMARY AND CONCLUSIONS.

In the preceding pages we have reviewed the more important literature on the bacteriology of the mouth, with particular reference to dental diseases, and gathered together certain data to confirm the following conclusions:

1. Mouth streptococci are the only true parasitic organisms of the normal, characteristic mouth flora, since they alone are capable of maintaining existence on the clean healthy mucous membranes before the eruption of teeth brings conditions of uncleanliness and decay. They are the most numerous of the mouth bacteria.

2. Mouth streptococci are only relatively decreased in the mouth in conditions of uncleanliness and decay; they may be absolutely increased. This relative decrease cannot be accepted as evidence that streptococci do not cause the dental diseases that follow uncleanliness in the mouth.

3. Mouth streptococci are the microbic causes of dental caries, pulpitis, alveolar abscess, and pyorrhea alveolaris, because:

a. They are the only organisms found commonly in these lesions, which are of proven pathogenicity, as exhibited by local invasive power, ability to invade the

blood and lymph streams and so produce metastatic infections, and by the results of animal inoculation experiments.

b. They are the only organisms found constantly in the deep layers or advancing borders of infected tissue in the diseases named; they are frequently found in these areas in pure cultures.

c. In metastatic infections and in experimentally inoculated animals they produce subacute and granulomatous lesions similar to the inflammatory reaction found in pyorrhea and in chronic alveolar abscess.

4. The streptococci found in dental diseases are the true mouth streptococci (**Streptococcus salivarius**) and invade the dental and peridental tissues from the mouth.

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ORAL HYGIENE IN THE ARMY.

By 1st Lieut. J. R. Bernheim, Dental Corps, U. S. Army, Fort Logan, Colo.

(Read before the National Dental Association at Its Twentieth Annual Session, Louisville, Ky., July 25-28, 1916.)

DUE to the greatly increased prominence which has been given the subject of oral hygiene in the literature of the dental profession in recent years, many of us are prone to look upon this subject as something new in the practice of dentistry. To the contrary, oral hygiene has been preached and practiced for several thousands of years.

Thorpe says, "The necessity of the cleaning of the teeth was dwelt upon by the Egyptians three thousand years before the coming of Christ, as an aid to physical beauty as well as a prophylactic measure."

"The ancient Hindus, Chinese, Greeks and Romans also preached and practiced mouth hygiene, and, I doubt not, were more familiar with hygienic rules than the average layman of today."

Many of Guerini's quoted passages from the medical writers of ancient times indicate most conclusively that the value of oral hygiene was recognized and taught by the ancients some thousands of years before the Christian era.

Cornelius Celsus, a Roman, tells us, about the time of the birth of Christ, that, "after rising, if it be not winter, the mouth should be rinsed with a quantity of fresh water." He further advises that stains on the teeth be scraped away, speaks of the use of an astringent mouth wash of pure wine, and advocates keeping the head well covered, exercising a great deal, and eschewing acid foods. All these are hygienic precepts of recognized value today.

Pliny, the Roman, Damocrates, the Greek, and a considerable number of other writers of ancient and more modern times, have not neglected to include in their writings, references to the value of mouth hygiene.

It can hardly be questioned, therefore, but that the teaching of oral hygiene began with the earliest practice of dentistry.

The work of the dental profession during the last decade has done more, probably, to popularize this movement, and place it upon a rational basis, than the labors exerted toward this same end during the five thousand preceding years.

Even now, however, hardly more than a fair start has been made. Many questions dealing intimately with oral hygiene are yet to be cleared up thru ex-

tended scientific and clinical observation; simplified rules of home prophylaxis with easily comprehended "reasons why" are to be devised if the great mass of the community is to be reached; and unceasing publicity must be given to this matter thru every legitimate avenue if the movement is to exert its proper influence upon the race.

How much attention was bestowed upon the question of oral hygiene in the armies of the world up to within comparatively recent times it is difficult to say. There can be little question but that the necessity for a sufficiently healthy oral cavity to enable the soldier to subsist upon the ration which active campaigning entailed upon him must have been apparent to all military commanders, but it is doubtful whether any very serious consideration was ever given to this matter.

In ancient times the individual had few rights which the State felt called upon to respect, nor was any great degree of consideration evidenced for his health or general welfare, and it is probable, therefore, that, while the advantage of a properly functioning masticatory apparatus in the soldier may have been recognized, little attention was given to securing or maintaining such a condition.

We know that in more modern times a considerable degree of attention must have been bestowed upon the condition of the mouths of the members of the military forces of France, at least, from the writings of Fauchard, the "father of modern dentistry," who tells us, in seventeen hundred and twenty-eight, that 'he received his first instruction in the rudiments of dentistry from Alexander Poteleret, surgeon-in-chief of the French Navy, who had great experience in diseases of the mouth.'

In our own Army, the value of oral hygiene in its relation to the general health and efficiency of the soldier has been recognized for many years.

In his "Theory and Practice of Military Hygiene," published as far back as 1901, Munson, then a captain in the Medical Department of the United States Army, lays considerable stress on the necessity for proper care of the soldier's mouth. His article on this subject is probably the most complete exposition of oral hygiene to be found in any of the works dealing with the sanitary care of troops.

Munson tells us that the efficiency of the soldier is considerably impaired by broken or carious teeth. Such teeth expose him to the liability of odontalgia, alveolar abscess and periostitis and impair his powers of mastication to such an extent as to often induce, with the use of the hard ration of the field, diarrhea and other intestinal disturbances. In the tent and in the squad-room, foul and diseased mouths are annoying, if not actually dangerous to the soldier's comrades, the fetid breath polluting the atmosphere and the saliva of such cases containing an unusual proportion of pathogenic bacteria.

He ventures the belief that ulcerative stomatitis, of frequent epidemic appearance among troops, tho probably of scorbutic origin, may be often prevented, and its severity, when occurring, modified by proper care of the mouth and teeth. He suggests the employment of dentists by the Government to care for the teeth of the soldier, and the addition of a tooth brush to the soldier's prescribed equipment, and urges that the proper use of the tooth brush be required in all instances. He further states that it is undoubtedly the case that in our service the hygiene of the mouth receives far more consideration than is given it in foreign armies, and gives as an outline of the necessary care of the mouth: that tooth brushes, made of soft bristles, should be used twice daily, not too forcibly employed for fear of rendering the teeth sensitive thru mechanical retraction of the gums; that the motion of brushing should always be in the direction of the teeth and never across their

surfaces, and states that, as a tooth preparation powdered chalk best answers all purposes.

It should be remembered that this excellent article was written, with its strong plea for the observance of the rules of oral hygiene in the Army, some time before the possibilities of the oral cavity and its contained structures as a probable source of infection were fully recognized.

It has been recently shown that many cases of nephritis, carditis, endocarditis, arthritis, endarteritis, gastro-enteritis, gastric ulcer, pneumonia, hysteria and insanity, and other serious pathological conditions of remote organs and tissues of the body, hitherto of obscure etiology, are directly traceable to foci of infection and abnormal nerve stimuli existing or originating in the oral cavity.

How much more evident now, therefore, with this further knowledge, is the duty of endeavoring to secure a proper and general observance of the rules of mouth hygiene both in the Army and in the civil community.

Only since nineteen hundred and one has the United States Army been authorized to attach properly qualified dentists to its personnel, and not until nineteen hundred and twelve was such authority granted to the Navy. Previous to this, certain enlisted men of the Army —some, graduate dentists, others, more or less indifferently equipped to perform dental operations—were permitted to render such dental aid as they were able to give to the afflicted soldiers.

Since the establishment of the Dental Corps of the Army, while many thousands of operations covering the entire field of dentistry have been performed each year, no systematic effort has been made to carry on the oral hygiene propaganda in the Army to the extent to which its importance would seem to entitle it.

This may be ascribed, to a great extent, to the very large clientele, usually from two to five thousand individuals, which existing circumstances have made it necessary for the individual dental surgeon to endeavor to care for.

For the Army dentist to attempt oral prophylaxis in any serious manner, thru operative procedure, has been altogether impracticable, and the prospects are not bright for any material change in this respect in the near future; but it is believed, on the other hand, that improvement in the method and extent of the instruction given with reference to the rules, the benefits and the necessity of oral hygiene may be practicable at this time.

The members of the Army Dental Corps, and often members of the Army Medical Corps, have done considerable valuable work along this line, however, principally in the form of endeavoring to impress upon the soldier the value of the simple rules of mouth hygiene.

New recruits in the Army, upon acceptance by the recruiting officers stationed in various sections of the Country, are ordinarily sent to one of five distributing and training centers known as recruit depots. Here they receive their military equipment and preliminary military training. Included in the articles in the "recruit kit" furnished each recruit, is a tooth brush. In many cases this is the new soldier's first acquaintance with this article, the tissues and flora of the mouth having theretofore been left to wage their never ceasing battle unhindered, usually to the clearly apparent injury of the tissues, both soft and hard.

At each recruit depot there is stationed one or more dental surgeons, and practically every recruit comes in contact with the dental surgeon before he (the recruit) is assigned and forwarded to his permanent organization. It is here that the recruit gets his first instruction in the rules of oral hygiene. This instruction is of necessity not as detailed as could be desired, it being readily understood that time would not permit of any extended individual instruction where occasionally as high as a

hundred men are enlisted in a day at the busier recruit depots. The soldier is advised as to the proper method of cleansing the mouth and teeth and the value of such procedure, and is instructed to consult an Army dental surgeon or a civilian dentist immediately upon becoming imbued with a suspicion of any trouble in connection with the oral cavity.

In his organization, he is further influenced by the example which his associates set, and it may be stated that this is an influence of considerable potency. The older soldiers take a most commendable pride in their personal appearance and personal cleanliness, and the newcomer soon learns that a similar observance is expected of him, and that any neglect in this respect will bring upon him the ridicule and opprobrium of his comrades. Thruout his enlistment, this soldier, unless his case be an unusual one, comes under the observation, at various times, of some member of the Dental Corps and is further instructed and admonished, if necessary, as to the care of his mouth, receiving at the same time such dental service as conditions may permit.

Once having fully tasted of the benefits and comforts attendant upon the new regime, it is seldom that a soldier takes the backward trail in this respect, and when he finally leaves the service, if the instruction which he has received has borne fruit, he is not only an observer of the rules of oral hygiene himself, but, as Tignor, of the Army Dental Corps, points out in his excellent paper on "The Educational Value of Oral Hygiene in the Army" read before the Panama-Pacific Dental Congress at San Francisco in 1915, he becomes also a teacher of these imporant principles of health to his friends and associates in the civil community to which he returns, and when it is realized that approximately fifty thousand men may be expected to leave the service each year, the possibilities of the important benefits to be drived by the general public from the oral hygiene movement in the Army must be apparent.

Looking at the matter from the other point of view, it would seem that the members of the dental profession owe it to the security of the Nation, in addition to the higher mandates of humanity, to endeavor to inculcate in the minds of the youths and young men of today the important precepts of oral hygiene in order that those who may be called upon to serve their country in time of need may be thoroly fitted for the work of the defender in so far as it is within the power of the dental profession to make them so.

Such work as that undertaken by the Preparedness League of American Dentists, wherein each member of the League is expected to render the necessary dental attention to one needy potential recruit each year to prepare him for military service, and, presumably, this includes instruction in the necessity for the observance of the rules of mouth hygiene, cannot but inure to the benefit of the dental profession, the public, the oral hygiene movement, and the military forces of the Nation, and it is believed is worthy of strong commendation and encouragement.

Oral hygiene could never expect to assume its logical position in the field of health conservation, nor exert its full influence for good, but for the work in scientific research which has been carried on in the past by a few self-sacrificing individuals, and which has recently been greatly encouraged thru the activities of the Research Institute of the National Dental Association.

In conclusion, may it not be said that oral hygiene in the Army, as well as in the civil community, will probably obtain its best results thru a properly conducted campaign of education rather than thru any prophylactic or restorative treatment which the members of the profession may undertake to supply. Without intelligent cooperation on the part

of the people, oral hygiene can never be a general success, and, unless its principles and benefits are made clear, intelligent cooperation cannot be expected.

If to the laity—soldier and civilian—can be effectively taught the benefits to be derived from a conscientious adherence to the rules of mouth hygiene, and if, at the same time, a simple and easily practiced, yet effective, regime for home prophylaxis can be devised and freely heralded to the public, the dental profession will have conferred upon humanity one of its greatest boons.

May we not then, in our desire to promote the welfare of the race, devote to this subject, to marked advantage, an equitable share of our thought and effort, in the consciousness that energy expended along this line means so much more to the improved condition of humanity than whatever time and labor we can possibly give to devising methods for repairing the preventable ravages which must always result from a lack of knowledge and observance of the proper rules of oral hygiene.

ORAL HYGIENE AND THE DAILY PRESS.

The Philadelphia North American ranks health as the first consideration in all that concerns public welfare and mass progress, and believes that it is the duty of every newspaper to help in work of this sort. For many years the North American has devoted much space to the presentation of easily comprehended facts relating to the progress of science against disease.

In a recent issue the Editor declared that—

"At the present moment, science has come up against the ivory wall of the teeth. Suddenly it has revealed to us the mouth—the upper opening of what actually is the channel of life—as a source of disease in a way quite different from that heretofore known.

"Always it has been known that the body might suffer from what entered it thru this opening, and of late years the public has been protected against impure foodstuffs and poisons.

"Later we come to understand the health value of proper mastication. And now we are being shown that it is not alone what goes into the mouth and is chewed by the teeth that regulates our physical well-being; but what stays in the mouth, between the teeth, to decay and cause decay and thus lead to conditions favoring bacterial growth.

"Perhaps no phase of scientific research shall have produced larger benefits than this, once it has fully expanded."

As a sample of the articles published from time to time by this newspaper, we reproduce herewith a clipping taken from a recent issue:

HOW ARE YOUR TEETH?

For the reader who might view such a question as an intrusion on personal privacy, we here repeat an interesting —and true—little story recently printed in our news columns.

Down in Milford, Del., a company of the national guard assembled to answer the President's call.

On physical examination, more than half of its members were rejected. At once was started an automobile canvass to round up recruits and fill the depleted ranks.

More than enough substitutes were found, but it was evident that most of these would be rejected because of the condition of their teeth.

Two officers of a dental supply company in Milford and two local dentists

volunteered to do what they could. After a whole day of hard work, they got the defective mouths fixed up temporarialy.

"The teeth of virtually every one of the men who received treatment were in such a shape that two months' stay on the border would have resulted in sickness for all of them," said one of the experts, at the close of the strange clinic.

He did not mean toothache or swollen jaw. Such ailments yield to simple treatment, as a rule.

But it might be rheumatism or indigestion, tonsillitis or anemia or even tuberculosis or some malignant stomach growth. Naturally, these affections have varying periods of development, but in the estimation of some of the ablest medical experts, their attacks and progress often are due to decayed teeth and resulting bad mouth conditions.

As a matter of fact, wide awake doctors everywhere are coming to look at patients' teeth in much the same way that old-time practitioners examined the tongue. For one of the most notable advances in the recent history of medical science is based on a growing conviction, backed by widespread experience, that the general state of health is largely controlled by the condition of the teeth and gums.

So renowned an authority as Dr. William Mayo has said that the next great field for surgery is the mouth; that when the relation between its condition and that of the rest of the body is more fully understood, human ailments may be reduced to a minimum beyond any yet approached.

Dr. Edward Carl Rosenow, who, as bacteriologist, is associated with the Mayo Brothers in their world-famed hospital at Rochester, Minn., has definitely traced a direct relationship between pus in tooth sockets, behind badly placed fillings, and diseased tonsils, inflammation of the heart-lining and chronic rheumatism of the joints.

In some of the rheumatism cases the site of the trouble is so far removed from the infected tooth—knee-joint or ankle, for instance—that one not on the lookout for the particular source would never think of connecting the swollen, painful joint with tooth trouble— and painless tooth trouble, at that!

Yet, in conjunction with experimental work by Dr. Frank Billings and other leading Chicago doctors, Rosenow has been able to develop from pus taken from human mouths a whole chain of micro-organisms—mostly streptococci—which seem to have a curious selective action for certain parts of the body.

For, when injected in experimental animals, some of these invariably attack the appendix, while others produce gastric ulcers or infect the gall-bladder or inflame the lining of the heart.

In the case of tuberculosis, according to Kellogg, the tubercle bacilli travel around the root of the decayed tooth to the lymphatic glands of the neck, whence they gain access to the general system, or directly attack the nearest apex of the lung.

So it seems to be reasonably proved that one of the best ways to prevent many common diseases—and among them some of the most disastrous—is to take care of the teeth and keep them in good condition. And that one of the effective means of relieving these diseases is thru proper attention to and treatment of decayed teeth or diseased gums. —*Oral Health.*

Legislative Department

AN UNJUST PROFESSIONAL HANDICAP.

By Otto U. King, D. D. S., Huntington, Ind.

The matter of dental legislation has been given more or less prominence in these pages for some months. It has been the aim and effort of the dental profession for years to obtain adequate federal recognition of its standing among the learned professions.

For a number of reasons unsatisfactory progress was made along this line up to the time of the reorganization of the National Dental Association, principal among these being, probably, the impracticability under the old system of organization of harmonizing and coordinating effort along any given line.

The first effort of our reorganized Association to obtain the recognition due the profession was made during the 1915-1916 session of congress and in the legislation which was enacted by this congress for the Army and Navy. A good degree of progress was made toward obtaining the recogniton desired tho the profession was still left in an unenviable position in this respect.

It is now proposed to procure if possible the enactment of supplemental legislation which will remove all govermental discrimination against the dental profession and place it upon a par with the other professions represented in the federal service.

The accompanying table shows graphically the position of the dental profession in the military service as compared to the other professions in the non-combatant branches of this service.

It is apparent from this table that the dental profession has a poor relative standing in the Military service, and this is decidedly injurious to the profession's interests, and an unwarranted humiliation.

The Adjutant General's Department and the Quartermaster Corps of the Army correspond to the business profession in civil life, the Adjutant General's Department being the administrative department and the Quartermaster Corps having charge of the purchase and distribution of supplies, supervision of construction work and the payment of the troops. The Inspector General's Department corresponds most nearly to the profession of public accountant and auditor in civil life; the Judge Advocate General's Department to the profession of law; the Medical Corps to the medical profession; the Engineer Corps to the profession of engineering; the Ordnance Department to the profession of arms and munitions manu-

facture; the Signal Corps to the profession of telegraphy, telephony and aviation; Chaplains to the clerical profession; the Dental Corps to the dental profession; and the Veterinary Corps to the profession of veterinary surgery. The Infantry, Cavalry Coast Artillery and Field Artillery—the combatant branches, or the line, of the Army—represent the profession of arms.

Can there be any just reason why the dental profession should not have recognition by the federal government equal to that of these other professions? Certainly not, and it is our duty to ourselves and to the profession to lend our unqualified support to the effort to have this injustice to the profession corrected at the earliest possible moment.

The most propitious time to secure the enactment of the desired corrective legislation is at the present time when congress is in the mood to devote a considerable share of its time and attention to military matters. This, however, should be looked upon merely as a fortunate circumstance and not the prime reason for undertaking the prosecution of this work with all the vigor possible. The compelling reason is, or should be, the unjust stigma which is put upon the dental profession by reason of its present status in the military and naval services and the injury done the profession thereby.

It may not be fully realized that the profession suffers directly thru this condition of unjust governmental discrimination. Under conditions now obtaining, members of the dental profession

COMPARATIVE SCHEME SHOWING THE ORGANIZATION NOW AUTHORIZED (ACT OF JUNE 3RD, 1916, "NATIONAL DEFENSE ACT") FOR THE DIFFERENT NON-COMBATANT BRANCHES OF THE ARMY.

	Major or Brig. General	Cols.	Lt. Cols.	Majors.	Captains.	Lieutenants	Per centum above grade of Captain.
Adjutant General's Department	1	7	13	30	.....	.....	100%
Inspector General's Department	1	4	8	16	.....	.....	100%
Judge Advocate General's Department	1	4	7	20	.....	.....	100%
Quartermaster Corps	3	21	24	68	180	73(a)	39%
Medical Corps	1	47	80	350	(b)	1000(b)	32%
Corps of Engineers	1	23	30	72	152	227	25%
Ordnance Department	1	10	15	32	42	42	40%
Signal Corps	1	3	8	10	30	75(c)	17%
Chaplains	.....	.....	.....	15	(d)	128(d)	10%
Dental Corps	.....	.....	.....	15	(e)	160(e)	8%
Veterinary Corps	.....	.....	.....	118(f)	(f)	(f)	100%

(a) The grade of 2nd Lieutenant in the Quartermaster Corps is a grade that was recently given to the former pay clerks connected with this corps. These pay clerks are limited to the grade of 2nd lieutenant, and therefore the 73 officers (all former pay clerks) under the heading "Lts." are not considered in making up the percentage allowed above the grade of major.

(b) All officers of the Medical Corps are promoted from the grade of first lieutenant to that of captain after **five** years service in the Medical Corps. Original appointments are to the grade of 1st Lieutenant.

(c) The Aviation Section is not included in the Signal Corps as given, as this section is practically a separate organization tho made a part of the signal Corps by law for purposes of administration.

(d) Chaplains re appointed as first lieutenants, are promoted to the grade of captain after **seven** years' service, and to the grade of major after **seventeen** years service, the total number in the grade of major being limited to fifteen.

(e) Officers of the Dental Corps are appointed as first lieutenants, are promoted to the grade of captain after **eight** years service, and to the grade of major after **twenty-four** years service, the total number in the grade of major being limited to fifteen.

(f) Officers of the Veterinary Corps are appointed as second lieutenants, are promoted to the grade of first lieutenant after **five** years service, to the grade of captain after **fifteen** years service and to the grade of major after **twenty** years service, with **no limitation** as to the number in the grade of major.

who are eligible—those with both the D. D. S. and the M. D. degrees—are seeking entrance into the **medical section** of the Officers' Reserve Corps of the Army rather than in the **dental section,** tho personal preference may incline to the latter, because of the fact that appointments to the grade of **captain and major,** as well as to that of first l'eutenant, are available in the medical section, and to even higher grades should there be at any time a call for Volunteers, while in the dental section appointments to the grade of first lieutenant only may be made, and no appointments to the grade of captain or major may be made until after a service of eight and twenty-four years service respectively. This, if not corrected, will operate to cause many of our most prominent oral surgeons to join the **medical section** of the Officers Reserve Corps rather than the **dental section** in case their services are needed by the government, and all of the work they may do will accrue to the benefit of the medical corps and consequently to the medical profession, and the dental profession will be deprived of credit for the work of some of its most brilliant men.

It is further believed that our research work is handicapped by this unjust discrimination. It is not unusual for members of the various professions to approach philanthropically inclined individuals in behalf of the needs of their respective professions for assistance in the matter of prosecuting original work or of promoting the interests of humanity in other ways.

If it is a matter of open record that the national government after sixteen years intimate experience with the work of the dental profession (the first dentists were attached to the Army in 1901) appears, thru the status accorded the members of this profession in the Army and Navy, to look upon the services rendered by the representatives of this profession as of less value than those of the other professions, it is at once apparent that the work of inducing these individuals to look with favor upon the claims of the dental profession is greatly increased, while, on the other hand, if it is possible to point to the fact that the national government recognizes the equality of the dental profession in relation to the other professions, it should be measurably easier to secure for the dental profession a fair share of the philanthropies that are being continually dispensed thru the liberality of our men of wealth.

It is believed that it is well within the power of the profession to obtain the desired corrective legislation inasmuch as it will be legislation backed not only by the influence of the profession but, in addition, by every consideration of justice.

However, nothing worth while is obtained without a certain amount of effort and sacrifice and it is devoutly hoped that no member of the profession will fail to respond promptly and to his full ability to any call that may be made upon him in this connection.

INFORMATION RELATING TO APPOINTMENTS IN THE DENTAL RESERVE CORPS OF THE ARMY.

(From Surgeon General of Army, Washington, D. C.)

The National Defense Act of June 3, 1916, and the tentative regulations thereunder, provide for a dental section or branch of the Officers' Reserve Corps. The officers of the Dental Reserve Corps have the rank of first lieutenant, and are appointed and commissioned by the President, after having been found upon ex-

amination prescribed by him, physically, mentally and morally qualified to hold such commissions. Commissions are issued for periods of five years, at the end of which time the officers may be recommissioned, subject to such further examinations and qualifications as the President may prescribe. They are subject to call for duty in time of actual or threatened hostilities only. While on active duty under such call, they are entitled to the pay and allowances (including quarters, fuel and light) of their grade. They are entitled also to pension for disability incurred in the line of duty and while in active service. They are not entitled to pay or allowances except when in active service, nor to retirement or retired pay.

Appointees must be citizens of the United States, between 22 and 55 years of age, must be graduates of standard dental colleges, and must, at the time of appointment, be in the active practice of their profession in the States in which they reside.

The examination is physical and professional. It is conducted by boards consisting in each case of one medical and two dental officers of the Army, designated by the War Department.

The examination as to physical qualifications conforms to the standard required of recruits for the United States Army. Defects of vision resulting from errors of refraction which are not excessive, and which may be entirely corrected by glasses, do not disqualify unless they are due to or are accompanied by organic disease. Minor physical deficiencies may be waived.

The professional examination will be oral; if the applicant fails therein, he may, if he desires, have a written examination. An average of 75 per cent is required to qualify in the examination. The examination comprises the following subjects:

1. Dental Pathology and bacteriology.
2. Chemistry, physics and metallurgy.
3. Recent advances in dental surgery and technic.

Applications for appointment in the Dental Reserve Corps must be made in writing, upon the prescribed blank form, to the Surgeon General of the Army, Washington, D. C., who will supply the blank upon request. The correctness of the statements made in the application must be sworn to by the applicant before a notary public or other official authorized by law to administer oaths. It must be accompanied by testimonials based upon personal acquaintance, from at least two reputable persons, as to the applicant's citizenship, character and habits, and by his personal history given in full upon the blank form furnished him for the purpose.

Preparedness League

A PERSONAL LETTER REPLYING TO MANY INQUIRIES RELATIVE TO OUR WORK.

To the Individual Dentist:

There is much I would like you to know but I cannot write it all. I have just been in Washington, D. C., in conference with the authorities there. This is the work mapped out for us by the Surgeon General's Department. They wish us to go on with our work of preparing the mouths of applicants for enlistment. In order to avoid imposition I have proposed a blank form, which we will get you a copy of, as soon as possible requiring duplicate signature. The applicant signs it at the recruiting station and duplicates it for the dentist. A mouth free from disease producing conditions and four (4) opposing molars, two on either side, will admit them. This requirement is a joke but we can change it no doubt, if desired.

Dental colleges, dispensaries and hospital clinics should be placed at the disposal of members of the League where these applicants may be cared for. This plan is being arranged for in New York and other large centers. The Navy League is giving much publicity to this phase of our work to promote greater interest in enlistment. The Council of National Defense is deeply interested in our efforts and we are connected therewith by Dr. Edward C. Kirk, who is a member of that official body. Also the National Security League is anxious to cooperate with us and assist in giving greater publicity to this fundamental object of the League.

Next, we are to organize the Officers' Reserve Corps, Dental Section. First of all, we are to select a limited number of men between the ages of 30 and 45, if possible, who will take the first examination. From the successful ones will be chosen members of the various examining boards necessary to supply the different parts of the country. We are then to pass upon all candidates until we have a full corps of 1,000 in service, and 1,000 for alternates. The commission is that of first lieutenant and salary of $2,000 per year, service not required except in actual war.

Our work now shifts to the Red Cross Department, where our connections are even more closely related. First, we are to supply all Red Cross base hospitals with dental units, consisting of two active and two alternates.

We are planning to establish dental units of the League at all summer training camps and arrange that all our members who desire may join these camps, taking the full military training or that which will be specially arranged for the dentist. Regular dental service, as well as special work, will be done in the clinics where all the instruction received at the units will be put into practical use so far as possible under such conditions. This plan should be vigorously prosecuted and

I recommend your early action. The chairman of each unit automatically becomes a member of a National Committee for this purpose. It is possible, even that the full course of Unit instruction may be given at the campus, however, special lectures by medical and dental military surgeons will be given, particularly on necessary military tactics and the military manual.

The ramifications of our work leads us into many different departments of service and fields of activity which I cannot enumerate here but will furnish you with a chart which covers the principle ones. New plans are evolving every day and our scope of usefulness is broadening to an almost unbelievable degree. So much for what we may term our Public Service Dept., which is for the benefit of our country.

NOW FOR OUR PROFESSION:

First in importance is the Sectional Unit plan for the study of oral and dental war surgery. The original plan of organization will be found on pages 176-7 of the Feb., 1917, issue of The Journal of the National Dental Association. On page 178 is a tentative synopsis of general course of study which may be followed to prepare our members for the entrace examination to the Officers' Reserve Corps, dental section. These units serve as a post-graduate course for the mature practitioner, also, and have a high and definite educational value. We are obliged to acknowledge the inadequacy of our educational training in this present weakest branch of our professional tree and the Sectional Unit study course is the logical source of strength.

If such knowledge shall not be needed to assist our country, we shall find ample use for it in out every day duties. However, the great impelling motive that it is dedicated to, the protection and honor of the greatest flag of any nation, our own Old Glory, is sufficient to bring us together as a solid phalanx, an army within ourselves, upon which our great fighting forces must depend for strength and support.

A great many units are already formed and the members are enthusiastically drinking in every drop of knowledge and information that can be used to their benefit. I do not hesitate to predict that a new, properly educated, broader, more liberal and thoroly unified dental profession will rise up out of the spark fired by our League and I will add the prediction that it will eventuate in the addition to the curriculi of every reputable dental school of our country, a full, comprehensive course in oral and dental surgery. Further than that, it will hasten the unification of our dental laws that will give us the mutual interchange of licenses.

The course of study for the Units is being standardized by Dr. Kirk, who expects soon to have the official approval of the Surgeon General. Dr. Kirk also has plans on foot whereby the buildings of the old Medico-Chi will be converted into a League base hospital where this course of instruction, both theoretic and practical, will be given to all members of the League who wish to enter the Dental Reserve, entirely free of charge. Such is to be the contribution of the University of Pennsylvania Dental Department to this great cause. It is a most commendable action on their part and one that should be appreciated by the profession at large. The University of Maryland, Dental Dept., of which Dr. B. Holly Smith is dean, is to carry out a similar plan and Dr. Brophy's College in Chicago will do the same. Already Dr. H. E. Friesell, dean of the dental department, University of Pittsburgh, has done much in this direction and is one of our pioneer members who early grasped the significance of our work and has done much for the cause.

The dental department, University of Buffalo, has given the Buffalo Unit the full use of its privileges as has the College of Dental and Oral Surgeons of

New York. Whenever possible, units should follow this idea, for all of our institutions are ready to render every assistance to us. The dental department of the University of Southern California is cooperating with the Pasadena Unit, which meets every week and is making splendid progress.

Our organization has reached a point where we believe our best interests will be served by our organizing each state thru the state society officers and have each component society form one or more sectional units according to the needs in each locality. This plan will now be prosecuted as rapidly as possible. New Jersey has proposed such action and the officers of the Union County Unit are planning to examine and chart the mouths of all male citizens between the ages of 18 and 25, who might be subject to compulsory military service.

Aside of the great educational value of this propaganda to us as individuals, which is far beyond any possibility of measure, we must help each other in another way. All dentists will not be able to serve, in event of war, in fact, only a small proportion, therefore, the "stay at homes" must care for the patients of the absent ones and positively return them to their dentist upon his return. Every League member should obligate himself to faithfully fulfill this compact and let no condition which we can control interfere with such action. I would like every Unit to present this as a resolution to its members.

I would call your attention to the Bulletin of the Association of Military Dental Surgeons, published by Dr. John B. Milliken, San Francisco. He is issuing a preparedness lead number which he is anxious to mail to every member of our Units, free of charge. It will contain much information of value to us especially on military subjects and I wish you would send for the number of copies you desire.

The Journal of the National Dental Association is the official organ of the League and in which will be found matters of special interest to us each month. We are very glad to announce the addition of Dr. Truman W. Brophy to our Board of trustees. Nothing I might say would add to the significance of this connection which I am sure will meet the heartiest approval of all our members.

Our second annual meeting will take place on the 23rd of October, 1917, in Concert Hall, Hotel Astor, New York. It is held in conjunction with our N. D. A. meeting. It is the hope of the chairmen that our progress will merit permanent organization of the League and that its field of usefulness may broaden to the extent, that it may acquire the comprehensive title "The University of the National Association." Should this be brought about its sphere of activities would soon form intimate connections with many phases of public service and national work peculiar to our specialty. Each annual state society meeting should have a paper or address given relative to the League and we recommend that the Local Unit, where ever such meeting may take place, will arrange for an oral surgery clinic, the operator to be a member of the said Unit, if possible. This stimulates interest and a desire to excel.

I would impress you with the paramount importance of keeping the great principle of the League free from unsavory influences. Neither faction, fraternities, cliques or politics can commingle in our endeavors without taking therefrom the spirit of the organization. Guard our precepts faithfully and jealously, for the League is founded to assist those who need its offices most and let us hew to our slogan, "of our profession, for our profession and for our country, if need be." "Nothing glitters like generosity, and the more we give the greater will be our benefits."

Fraternally yours,

J. W. BEACH, Chairman,
131 Allen St., Buffalo, N. Y.

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Editorial Department.

SUPPORTING ARGUMENTS FOR THE PROFESSION'S LEGISLATIVE PROGRAM.

We have been asked as to the status of the dental profession in other armies of the world. On account of war conditions it has been impracticable to obtain satisfactory data along this line. We know that in the Canadian army the dental surgeons go as high as lieutenant-colonel or colonel, and in the Austrian army their status is exactly the

same as that of the medical officers. However, irrespective of this, the United States army was the first army to attach to itself a dental corps, and the profession of dentistry in America is universally acknowledged to be far in advance of the dental profession in any other country, and it would, therefore, be manifestly unfair, in granting governmental recognition to the profession, to take as a basis the recognition granted the dental profession in other countries. We do know that the dental surgeons are doing a great work in the European War and that they are attached in large numbers to the belligerent armies.

Our motto, certainly in this country, should be **"absolute equality with the medical and other professions".** To ask for less, or to accept, as satisfactory, anything less, would be an acknowledgment of inferiority and this idea should be obnoxious to every properly qualified member of the dental profession. The paper on **"An Unjust Professional Handicap,"** appearing in this issue should be carefully read by every member of our profession.

A fact that may be mentioned to advantage is this, that the dental school course as adopted by the standard dental schools is now four years, exactly the same as the time required by the standard medical schools, and that the preliminary requirements are equally as high for the dental schools as for the medical schools.

Do not forget that the dental profession gave to the world general anesthesia, one of the greatest boons ever conferred upon humanity.

The statement may be made that the medical man deserves more than the dental surgeon because his work is more important. We do not and should not admit this. Dentistry is a highly specialized branch of medicine, of **greater importance** to the health, welfare and longevity of the human race than any other specialty of medicine, and as **important**, we believe, considering the vast number of people suffering with oral defects and the important effect of these defects upon the human system, as all the other branches of medicine combined.

Another point, many medical officers specialize in the different branches of medicine after entering the service; they are encouraged to do this by the head of their department, and properly so, we believe, but it might be pointed out that this specializing on the part of the medical officer is accomplished while in the pay of the government, whereas the dental surgeon is fully equipped in his specialty upon entrance into the service.

The argument may be advanced that medical and other officers are given higher rank on account of their administrative duties. The answer: there certainly can be no reason why a first lieutenant of twenty years service (if no higher grades were authorized) could not just as ef-

ficiently administer the duties of any position as a captain, major, lieutenant-colonel, or colonel of the **same length of service.** The real reason the different grades are authorized in all the corps and departments of the Army is to afford recognition to the respective professions, to offer opportunities for advancement in competition with opportunities in civil life, and to grant equality of status to the various classes of officers in the Army. There can be absolutely no equitable reason advanced why the members of the dental profession in the federal service should not have the same recognition as the members of the medical and other professions in every respect and it is important to our standing as a profession to employ our best efforts to bring about this equality in federal recognition.

SPECIAL NOTICE TO DELINQUENT MEMBERS.

This is the last issue of The Journal of the National Dental Association that will be mailed to any one who has not paid 1917 dues. It will be impossible for us to guarantee back numbers of The Journal, as we are only publishing enough to supply our bona fide subscription list.

This warning to the wise should be sufficient. However, the unwise must suffer the consequences; viz., **removal from the mailing list and broken files of The Journal.**

SPECIAL NOTICE FROM WAR DEPARTMENT.— OFFICE OF SURGEON GENERAL.

Examination of Dentists for the U. S. Army.

The Surgeon General of the Army announces that examinations for the appointment in the Dental Corps of the Army, will be held at Fort Slocum, New York; Columbus Barracks, Ohio; Jefferson Barracks, Missouri; Fort Logan, Colorado; and Fort McDowell, California, on Monday, May 7, and Monday, July 2, 1917.

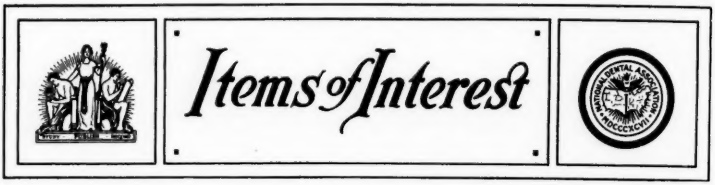
Application blanks and full information concerning these examinations can be procured by addressing the "Surgeon General, U. S. Army, Washington, D. C."

The essential requirements to securing an invitation are that the applicant shall be a citizen of the United States, shall be between 21 and 32 years

of age, a graduate of a dental school legally authorized to confer the degree of "D. D. S." and shall be of good moral character and habits.

Successful applicants will be immediately appointed (as far as the number of vacancies will permit) to the grade of First Lieutenant, at an entrance salary of $2,000.00 per annum.

In order to perfect all necessary arrangements for the examination, applications must be in the possession of the Surgeon General at least two weeks before the date of examination. Early attention is therefore enjoined upon all intending applicants. There are at present 14 vacancies to be filled and on July 1, 1917, there will be 22 additional vacancies.



BACTERIAL FINDINGS AND THEIR RELATIONSHIP TO PYORRHEA ALVEOLARIS AND INTERSTITIAL GINGIVITIS.*

By A. W. Lescohier, M. D., Detroit, Mich.

Few subjects in medical history have given rise to more frequent controversies than the inflammatory diseases of the gums. The classification, nomenclature, pathology, even the anatomy of the parts involved have afforded material for protracted argument. Probably no phase of the subject has been more keenly discussed than the etiology, and during recent years much of this interest has centered on the part played by bacterial invaders.

The probable relationship of pathogenic bacteria to the development of pyorrhea has been recognized for several decades. Mallasez and Galippe[1] (1884), Black[2] (1887), Miller[3] (1889) and Kirk[4] (1898) were some of the early investigators of its bacteriology. A variety of organisms were described, none of which could be specifically associated as the causative factor. Probably the first to ascribe etiologic significance to any particular micro-organism was Arkövy[5] (1904), who attributed acute cases of alveolar suppuration to streptococcic infection.

A detailed review of the voluminous literature on the bacteriology of pyorrhea and allied conditions appears neither necessary nor desirable. Many of the reports were based on studies the scope of which was limited both by the paucity of cases under observation and the facilities and training for their intelligent investigation. It seems advisable rather to try to correlate the facts established by those investigators who have definitely contributed to the bacteriology of the disease.

Perhaps the most notable of the early studies on the relationship of microorganisms to the pathology of pyorrheal diseases is that of Goadby[6]. His first report in 1907 described a variety of organisms occurring in connection with pyorrhea, to none of which it was possible to attribute a definite etiologic relation-

*Read before the section on Stomatology at the Sixty-Seventh Annual Session of the American Medical Association, Detroit, June, 1916.

[1]Mallasez and Galippe: Compt. rend. Soc. de biol., 1884.

[2]Black: Indep. Pract., New York, August, 1887.

[3]Miller: Die Mikroorganismen Mundhöhle, Leipzig, 1889.

[4]Kirk: Dental Cosmos, 1898.

[5]Arkövy: Brit. Med. Jour., 1904, 2, 1371.

[6]Goadby: Brit. Med. Jour., Sept. 9, 1905; Tr. Odontological Soc., March, 1906; Lancet, London, March 9, 1907; Brit. Med. Jour., Aug. 22, 1908; Lancet, London, Dec. 25, 1909; Practitioner, London, 1912, 88, 107.

ship. This group of organisms included in addition to the pyogenic cocci, various types of bacilli and spirilli. Curiously enough, in view of later developments and the fact that a study of his protocols shows that streptococci and staphylococci were found much more frequently, Goadby appeared to attach considerable importance to the bacillary forms. In 1908 Goadby reported the successful treatment of two acute cases of pyorrhea alveolaris with autogenous vaccines; in one of these the infection was mixed streptococcus and **Staphylococcus albus,** and in the other streptococcus was present almost in pure culture. In 1909-1910 a supplementary study of seventy cases was reported, in which the findings are given in Table 1.

During the period from 1907 to 1912 articles dealing with the bacteriology of pyorrhea were contributed by numerous workers, among whom may be mentioned Carmalt-Jones and Humphrey[7], Sims[8], Eyre and Payne[9], Fletcher[10], Beebe[11], Best[12], Williams[13], Logan[14], and Leary[15]. The results of their investigations were diverse and do not materially assist in clearing up the confusion existing relative to the bacteriology of the disease. The only deduction which they justify is that a number of micro-organisms, potentially pathogenic, may under certain conditions be isolated from suppurative lesions of the gums.

The possibility of spirochaetes being concerned pathologically in pyorrhea has received some attention. Various

[7]Carmalt-Jones and Humphrey: Lancet, London, Dec. 28, 1907.

[8]Sims: Dental Practitioner, Toronto, October, 1908.

[9]Eyre and Payne: Proc. Roy. Soc. Med., Odontological Section, Nov. 22, 1909.

[10]Fletcher, M. H.: Unclean Mouth and Its Evil Results, The Journal A. M. A., July 13, 1912, p. 94.

[11]Beebe: Boston Med. and Surg. Jour., Oct. 28, 1909.

[12]Best: Dublin Jour. Med. Sc., 133, 91.

[13]Williams: Am. Jour. Med. Sc., 1911, 142, 666

[14]Logan: Dental Rev., 1911, 25, 649.

[15]Leary: Dental Cosmos, 1909, p. 55.

TABLE I.—ORGANISM FINDINGS IN SEVENTY CASES OF PYORRHEA ALVEOLARIS.

Organisms	No. Cases Present
Streptococcus	19
Pneumococcus	3
B. necrosis-dentalis	14
M. catarrhalis	23
B. septus	15
Staphylococcus aureus	12
Saccharomyces	5
Micrococcus citreus-granulosis	6

workers, including Noguchi, have described spirochaetal types found in the oral cavity, and in 1912 Noguchi[16] isolated, in pure culture, from a case of pyorrhea a mucin producing spirochaete which he named **Treponema mucosum.** This organism is not regarded by Noguchi as strictly parasitic, but he ascribed to it pyogenous action under conditions in which the tissues have been so injured as to enable it to survive. The strong fetid odor in some cases of pyorrhea he believes to be due in part at least to the presence of **T. mucosum.**

Recent bacterial studies which seem to be entitled to careful consideration are those reported by Medalia[17], Brown[18], and Hartzell[19].

Medalia's reports were based on a study of 115 cases, in which a careful bacteriologic investigation appears to have been carried out. The series included fourteen incipient, sixteen moderately advanced, and eighty-five advanced cases. The findings reported are as given in Table 2.

We would be led to infer from these results that the pneumococcus is the most important organism to be considered, as it was found either alone or in combination in 107 of the 115 cases (93 per cent.), and the streptococcus only an occasional invader, as it was reported as being present in only fourteen cases (12 per cent.). The work of other in-

[16]Noguchi: Jour. Exper. Med., 1912, 16, 194.

[17]Medalia: Boston Med. and Surg. Jour., 1912, 167, 868, 922; Dental Cosmos, January-February, 1913.

[18]Brown: New York Med. Jour., 1915, 98, 1201.

[19]Hartzell: St. Paul Med. Jour., 1916, 18, 77; Report First District Dental Society of the State of New York, Jour. Allied Dental Societies, March, 1916.

vestigators does not, however, substantiate this deduction. Brown in forty-eight cases observed **Streptococcus viridans** twenty-three times, hemolytic streptococci thirty times, and non-hemolytic streptococci twenty-eight times. Pneumococci were present in twenty-seven cases, staphylococci, diphtheroids and organisms of the **Bacterium influenzae** group being also frequently found.

Hartzell's work, perhaps the most convincing of any that has been reported, points strongly to the importance of the streptococcus in pyorrhea. His observations have indicated that approximately three-fourths of the bacterial content of pyorrhea pus pockets is made up of pyogenic cocci of the **Streptococcus viridans**, and staphylococcus types, and the remaining one-fourth of other organisms. Hartzell's animal inoculations have shown that following the intravenous injection of pus from pyorrhea pockets streptococci of the viridans type are usually recovered, occasionally staphylococci.

Personal observations relative to the occurrence of streptococci, staphylococci and pneumococci in pyorrhea would place streptococci first in frequency, staphylococcus next, pneumococci being observed in only a small percentage of cases.

The scope of this paper does not extend to a consideration of the relationship existing between pyorrhea and systemic diseases. The importance of oral infection in metastatic infections of the heart, blood vessels, joints, kidneys and other tissues is, however, generally recognized. Hartzell has emphasized the fact that of the organisms found in the mouth, there are none having the varied possibilities for disease production characteristic of the streptococcus group. Clinical observations as well as the results of animal inoculations have clearly shown that in the remote pathologic effects of oral infection, the streptococcus overshadows in importance all other organisms which may be present in pyorrhea pockets.

A discussion of the causative factors in pyorrhea necessarily involves a consideration also of its pathology. Considering interstitial gingivitis and pyorrhea alveolaris as phases of the same disease, we generally recognize that bacterial invasion is characteristic of the pus stage and is not necessarily present in cases of interstitial inflammation without pus. The bacterial studies which have been reported are based largely on investigation of cases of the purulent type. The occurrence of gingival inflammation, without infection, as the result of trauma, irritation and constitutional influences during the non-purulent inflammatory stage of the disease is scarcely open to question. On the other hand, the conclusion of some investigators that bacterial invasion in pyorrhea is invariably a secondary factor, infection being universally absent prior to the pustular stage of the disease, does not seem to be established. An infected zone around the root of the tooth, usually due to acute streptococci infection, may exist. It would be strange indeed if this were not so, since the poorly

TABLE 2.—BACTERIAL FINDINGS BY MEDALIA IN 115 CASES OF PYORRHEA ALVEOLARIS.

	No. Cases with Organisms	Per Cent.
Incipient Cases (14)		
Pneumococcus and staphylococcus	10	71
Pneumococcus	2	14
Staphylococcus and streptococcus	1	7
Sterile	1	7
Moderately Advanced Cases (16)		
Pneumococcus and staphylococcus	8	50
Pneumococcus	6	37
Staphylococcus	1	6
Sterile	1	6
Far Advanced Cases (85)		
Pneumococcus and staphylococcus	49	57
Pneumococcus	18	21
Staphylococcus	1	1+
Pneumococcus and streptococcus	3	3+
Pneumococcus, streptococcus and staphylococcus	10	12
Pneumococcus and Micrococcus catarrhalis	1	1+
Staphylococcus and Micrococcus catarrhalis	2	2+
Sterile	1	1+

protected gingival crevice offers a splendid opportunity for bacterial attack, the microbic penetration being aided by the formation of calculi on the roots of the teeth or at the gingival margin and the number of the infecting organisms being augmented by the neglect of oral hygenic measures.

The tendency to consider any etiologic factor in pyorrhea as an entity instead of in relationship to other influences is unfortunate. Irritation, trauma, metabolic disturbances and microbic invasion constitute a vicious circle in the development of alveolar diseases. The bacterial element is probably the most important element in the destructive tissue changes and certainly so in the serious sequelae. While it is impossible definitely to classify interstitial gingivitis or even pyorrhea as primarily a microbic disease, the pathology is intimately associated with the results of bacterial invasion and the adequate consideration of its treatment must necessarily recognize the importance of the infectious element.

THE ROENTGEN RAY IN THE DIAGNOSIS OF PYORRHEA.*

By Hollis E. Potter, M. D., Chicago, Ill.

Roentgenography for the demonstration of pyorrhea alveolaris does not differ in its technical plan from that used in other procedures intended to shed light on diseases located in the jaw bones. The constant feature of the disease which makes its demonstration by roentgenoscopy possible is the ulceration of the presenting margins of the alveolar process and the more intimate bone about the roots. In general the extent to which this marginal bone is found to be eroded is the measure of the extent of the disease recorded on Roentgen-ray films or plates. The relative simplicity of a Roentgen-ray procedure which is required to show only the height or depth of a bone profile in so thin an object as the human jaw is quite apparent and in reality no such rigid technic is necessary in pyorrhea as in the demonstration of periapical disease, in which a focus of minor decalcification must be detected in and surrounded by a considerable mass of bone of variable and often complex structure.

This rough delineation of the general present depth of the process with respect to the dental roots in a case of known pyorrhea is therefore a relatively simple problem, and in itself is scarcely deserving of a lengthy dissertation. But in any series of pyorrhea cases the general roentgenographic survey is capable of bringing to light some of the minor changes about the roots of individual teeth, such as the localized or beginning extension of the disease toward a given apex, the softening of the adjacent alveolar wall due to an early inflammation of a single peridental membrane—the signs, in short, of the early and deeper encroachments of the disease which are so important in the complete diagnosis and prognosis of a pyorrhea case. For the detection of these minor but most important changes in the bony investments of the teeth only the most critical roentgenography is of value, and this must be combined with a careful and intelligent reading.

*Read before the Section on Stomatology at the Sixty-Seventh Annual Session of the American Medical Association, Detroit, June, 1916.

In roentgenograms of the normal denture, the spongy bone of the jaw uniformly envelops the dental roots and proceeds fully up to the point of attachment of the peridental membrane. In the most critical roentgenograms, the shadow of this spongy bone is seen thru the shadow of the dental root, but is most prominently visible in the septal bone. The septal bone is characteristically of triangular shape, with more compact bone at the marginal apex and at this apex one often sees an apparent fusion of the white line surrounding the adjacent roots. This so-called white line is the shadow cast by the denser walls of the alveolus between which and the roots themselves is the slight space occupied by the peridental membrane.

It is well known dental pathology that in pyorrhea the primary site of bone liquefaction is in that bone immediately adjacent to the peridental membrane. For this reason it is so often seen in roentgenograms that the marginal line of persistent bone is wavy with the deepest erosions in juxtaposition with the teeth. Whenever in roentgenograms it is seen that a localized or deeper absorption has occurred, it must be admitted that no correct inference can be made as to whether this erosion lies primarily on the labial, buccal or lingual aspect of the process. There is seldom seen in the most critical roentgenograms a double marginal line which could be known to represent, respectively, the inner and outer limits of erosion, and even where the double line is seen, it is impossible to distinguish the inner from the outer. Moreover, the film method calls for the projection of the light at such angles that, while the teeth show with minimum distortion, there is a palpable displacement on the film of the position for attachment of the peridental membrane externally with respect to its internal attachment. Should, therefore, the double line be visible in every case, a correct enterpretation would involve a reasonable discount for angular displacement. For this reason, the most accurate and comprehensive portrayal of the exact position and the extent of the erosion is often obtained by the stereoscopic method, in which the stereoscopic shift is made along a vertical line rather than along the usual horizontal line, for reasons apparent to those versed in stereoscopic roentgenography in general. To obtain the most valuable average line as a gross measure of the ulcerative process, roentgenograms may be made at a considerably lower angle than for demonstration of the apexes, altho an elongation of the dental shadows themselves will result.

Whether or not the general line limiting the ulcerative process can be followed across the shadows of the roots themselves, it will usually show plainly in the region of the septal bone. Wherever the teeth are normally spaced and the septal bone abundant, the marginal dissolution at the interspaces is very plain. In case the teeth are closely crowded and the septal bone small in amount, or when for any cause the ray angle used in the exposure was such that a lateral overlapping of dental shadows has resulted, the depth of septal bone is indeterminate. Inasmuch as the septal bone erosion is usually less than that in the immediate vicinity of the peridental membrane, the amount of septal destruction is not to be taken as the true limit of the encroachments of the disease on the jaw. Rather, this must be based on a careful observation of the integrity of the bone enveloping the peridental membrane farther toward the apex. Often a lateral or circumferential absorption can be followed deeply toward the apex. This appearance denotes a localized pyorrhea pocket, and is often concentrically funnel shaped. In conjunction with this funnel shaped dissolution, which extends around the tooth to a greater or less depth beyond the line of septal erosion, is often seen a more delicate partial decalcification of the white line ex-

tending to and around the apex, together with a slight widening of the space occupied by the peridental membrane itself. This finding is the premonitory sign of the inflammation of peridental membrane which precedes extension of the funnel shaped pocket to and around the apex. It is now only a matter of a short time till the entire depths of the root are surrounded by the liquefied products of the ulcerative pericementitis.

The limitations in the value of the Roentgen findings in any disease should also be mentioned. While the Roentgen findings in pyorrhea as a rule agree very well with findings elicited by a digital or instrumental examination, and are obtained with far less discomfort to the patient, there are certain respects in which they are disappointing. Let me mention a few of these: Sometimes a pyorrhea tooth is quite loose, and a well defined pocket is expected in the roentgenogram. Instead, it may require a stretch of the imagination to find in the roentgenogram more than a simple loss of the normal white line. This is undoubtedly because the atrophy which has occurred is diffuse and poorly demarcated. Again the tooth shows no looseness on examination, and the roentgenogram shows the deepest kind of a pocket. This apparent discrepancy is undoubtedly due to the escape from the disease of a limited portion of the investing structures, not recognizable roentgenographically, but sufficient in amount to maintain the stability of the tooth for the time being. A very important point in the diagnosis may be entirely undemonstrable by Roentgen methods, and I refer to the activity of the disease at the time of examination. Quite frequently roentgenograms are essentially similar in cases in which gross amounts of infective material can be expressed from the jaw to those in which the disease in all its clinical manifestations is entirely quiescent or advancing at a very slow rate. It may be sufficient to mention the general roentgenographic fact that in an ulcerative process in which bone shadows show partial or poorly limited decalcification, the process is in an active or rapidly progressive stage, whereas in well demarcated cases, in which areas of complete liquefaction lie directly adjacent to areas of undisturbed bone, the process may be considered more chronic in type.

Conclusions

A general survey of the denture by a series of dental films is an important adjunct to the examination of a pyorrhea case. It is often a short cut to a diagnosis and is less disagreeable than an instrumental examination, but should supplement rather than displace other diagnostic methods. The most important diagnostic points are observable in the region of the intimate bony investments of the roots and are obtainable only from the most critical roentgenograms.

THE IMPORTANCE OF A CORRECT DIFFERENTIAL DIAGNOSIS OF THE PREDISPOSING CAUSES IN CASES OF INTERSTITIAL GINGIVITIS OR PYORRHEA ALVEOLARIS.*

By M. L. Rhein, M.D., D.D.S., Lecturer on Dental Pathology, Department of Dentistry, University of Pennsylvania. New York.

Periodically, we are told that interstitial gingivitis, pyorrhea alveolaris, is caused by some special organism which the writer has just discovered. Specific investigation and attempts to corroborate these vaunted discoveries have always proved them to be erroneous. We are just

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beginning to recover from the shock of how little we know about the **Endameba buccalis.** The fact that a prominent research worker in medicine proclaimed to the world that the endameba was responsible for every case of pyorrhea, and that this disease was present in 95 per cent of our population, has been the direct cause of much confusion. Physicians lacking education in mouth physiology and pathology were especially imposed on by this dogmatic assertion.

Research work which I have conducted in the mouths of animals has corroborated the work of general observers to the effect that infection is impossible in an individual otherwise physically well. Considering, as we are, end-organ tissue, it must be admitted that unless prophylactic measures have been adopted, the so-called dental organs are the first to exhibit a diminution in immunity to infection, if any form of malnutrition is in evidence. If, by exercise, massage and other hygienic measures, the circulation in the ultimate capillaries is kept moving, the gums and peridental tissue will frequently retain their immunity, even tho malnutrition is present.

Pyorrhea alveolaris is a result of malnutrition plus infection, and also most frequently plus irritation, and it is greatly intensified if arteriosclerosis of the ultimate capillaries sets in. Only daily observation of the dental tissues can make one familiar with the appearance of a normal mouth, and without this knowledge, it appears impossible for any one to differentiate the different appearances of these tissues in different diseases.

While all forms of pyorrhea must commence with some form of gingivitis, yet the tissues in this and all succeeding stages vary in clinical appearance as markedly as do the generic types of malnutrition which interfere with a proper equilibrium of the circulation. The blue line in the gums as a result of mercurial toxemia, and the mucous patches due to syphilis, are old landmarks in medical diagnosis. In like manner the physician awaits the erruptive stage in order to make a correct diagnosis as between small pox and measles, or any of the other exanthems. It may, therefore, be asserted with assurance that the variations in clinical appearance of the gums and pericemental tissues point with unerring fidelity to the cause of the dyscrasia. When these are once read with the same assurance with which we now read the blue line, a great advance in the diagnosis of this disease will have been reached. When it is once duly appreciated that pyorrheal symptoms are a possibility at the very onset of any interference with the normal action of any vital function, and that a proper reading of their clinical appearance will disclose at once the nature of the trouble, the study of the dental organs will be properly comprehensible, and not until then.

The fact that pyorrheal manifestations are very frequently observed, without the investigator being able to obtain any confirmatory diagnosis of some form of malnutrition, is generally due to the fact that impairment of the vital organs progresses very slowly, and that frequently with our present day methods it is impossible to make a correct diagnosis until the disease has reached an advanced stage.

When, finally, as the organic disease increases, a correct diagnosis is made, it is not uncommon to find that this organic disease is believed to be caused by the pyorrhea. The poor diagnostic sense of the uninformed dentist is the cause of this frequent error in diagnosis, this placing of the cart before the horse. While an abnormality of some important organ or organs of the body is generally the predisposing cause, we see other types of pyorrhea where the predisposing cause is the decrease in functional power of the teeth themselves. Here loss of teeth by extraction, irritation under the gingivae from unpolished fillings, and every type of malocclusion become the predis-

posing causes instead of their being caused by some organic disease.

Every dentist will corroborate the great variation in the mouth picture which presents itself in different pyorrheal cases. We see the case without any deposit on the root in strong contrast with those in which these deposits seem to overwhelm all the exposed root structure. We see the gum abnormally dry and parched in contrast to those cases in which the mucous follicles are constantly excreting varying quantities of fluids. There is the pale anemic gum in contrast to the ruby red inflamed gum. We find pockets under the gums free from suppuration or exudation, in contrast to those cases in which there are purulent discharges, and the gums are so inflamed and spongy in character as to bleed on the slightest provocation. There are cases in which the gingival border is atrophied to a knife blade edge in contrast to every type of hypertrophied tissue. The gums at times will be found in all possible shades of color, and in certain cardiac diseases there is a sharp division line between a normal pink and dark blue in the gums in the same mouth.

We find no such variation in symptoms in any infectious disease. Small pox, tuberculosis, typhoid fever, measles, syphilis, yellow fever, diphtheria, etc., all possess well defined symptoms, which mark them unmistakedly as the disease in question.

In interstitial gingivitis or pyorrhea alveolaris, the clinical appearance is but a reflection of the predisposing cause. Each different picture will always be found associated with one particular predisposing cause. A carefully recorded study of these different pictures will soon make the observant stomatologist familiar with at least some of the more common types of malnutrition, and after a time he can readily recognize them on sight.

It has been my good fortune, because of experience with these clinical pictures, to have frequently been the means of directing the patient in the early stages of some serious ailment in keeping with rational treatment. It is impossible to estimate too highly the value of such a diagnosis being made in an early stage. It is wrong for us to discuss this subject as tho we were speaking of some specific disease instead of addressing ourselves to pathologic symptoms of one of many diseases.

The time will come, when the subject is under discussion, that it will be confined to the particular malnutrition causing a given type of pyorrhea. In 1894, I presented such a method of classification by prefixing or adding an adjective stating the name of the disease, which is causing the pathologic symptoms in the oral cavity, as "diabetic pyorrhea," "tuberculous pyorrhea," etc. Only under such a classification can rational discussion be held on this subject. Take, for example "nephritic pyorrhea" and "diabetic pyorrhea." While renal abnormalities occur in the predisposing cause in each type, nevertheless, the symptomatology and treatment should be entirely different in each type. When this point is conceded, due importance will thereafter be given to the necessity of making clear the nature of the predisposing cause of the cases under discussion.

It is well understood in general surgery that operative procedure is attended with great danger to life itself in patients suffering from diabetes not under control. Consequently, the same danger to life exists when surgical interference is commenced in pyorrhea when there is present an active condition of diabetes. The at one time well nigh universal habit of dentists using surgical intervention in diabetes without making any diagnosis of the predisposing cause has produced its quota of fatal consequences. In advanced stages of fatal diseases, it would be necessary brutality to subject the patient to the discomforts of surgery. On the other hand, when the disease is curable, it is of great importance that the

stomatologist should be given an accurate statement by the internist of every body disturbance, so that all local treatment should proceed in therapeutic harmony with the general treatment.

Prognosis of pyorrhea or gigivitis must largely depend on the possibility of obtaining a cure of the malnutritional factor. It is for this reason that the results of all physical examination, etc., should be in the hands of the stomatologist, so that he cannot only work in harmony with the physician, but also keep accurate record of any tissue changes that may take place.

When the preponderating importance of an accurate diagnosis of the predisposing cause of pyorrhea is appreciated, an important factor in the maintenance of our point of view is established to the effect that the dentist treating these and all other mouth diseases should be as efficiently educated in general medicine as is the specialist in any other department of medicine.

SOME STUDIES IN THE TREATMENT OF PYORRHEA ALVEOLARIS.*

By George Bailey Harris, D. D. S., Sc. M., Detroit, Mich.

In the consideration of the treatment of pyorrhea alveolaris, as with any other disease, we must presuppose a knowledge of the disease. There are, however, so many conditions suggested as being causative factors in pyorrhea, that it is hardly possible to assume that any one of them is responsible for pyorrhea, to the exclusion of the rest. Among the conditions which have been advanced as being causative agents in pyorrhea might be mentioned syphilis, rheumatism, liver affections and autointoxication. These conditions and any other which will lower the resistance of the tissues must be considered as causative factors in pyorrhea, and their eradicaton, wherever possible, must be accomplished when the treatment of pyorrhea is undertaken.

Pyorrhea should be looked on as an infectious disease and treated as such. Its inception, then, is based on the resistance of the tissues to bacterial invasion, which must be lowered before the infection can be overcome. This means the building up of the resistive forces thruout the entire body, as it is difficult to perceive how the resistance, under these conditions, can be raised in the gum tissues alone. This must be done not only to throw off the present infection but also to guard against its recurrence. The lowered resistance to the tissues surrounding the teeth is due, in many cases, to the well known calcium deposits and irritations produced by faulty dental work. These conditions must be corrected.

If, however, we better understood the causes of pyorrhea and knew more about the tissues most vitally involved in making a repair, we would be able to treat this disease more intelligently, and there would result a greatly increased number of recoveries.

I have been greatly surprised at the wonderful recuperative power of the cementum. The literature relating to this tissue is confined, in the main, to its description and histologic structure, very little being said about its use. Cementum is the bond between the teeth and

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the bone, the tooth and bone seemingly being unable to form a union themselves. It seems to have about the same recuperative power as bone, and, furthermore, under proper conditions, cementum has the power to regenerate, after it has been cut in grooves or removed entirely from the root, provided a sufficient amount of cementum is left on the root from which regeneration can take place. If, however, a large portion of the cementum is removed and the remainder then weakened or entirely destroyed by such mild germicides as trichloracetic or sulphuric acid, we should not expect to have any reformation of the cementum. When this is done, we might just as well take the next step at once and extract the tooth as wait and do the same thing at a later date or let nature throw it off herself.

Some time ago I had occasion to make an upper denture for a woman about 50 years old. She had worn full upper and lower dentures for some twenty years. On examining her mouth I noticed an enlarged and inflamed surface in the region of the second bicuspid. She informed me that it had been given her trouble for a long time and that she had to have a place cut out of the denture to avoid pressure on it. I opened into it and removed about one-third of the root of the second bicuspid which had been broken off when the tooth was extracted. The one side was flattened, but there were no sharp edges. A cross-section was made, and when put under the microscope it was found to be completely encased in cementum, the cementum on the flattened surface being nearly a third thicker than the other. A section made near the apex of the root showed a normal condition, with no variation in the thickness of the cementum. When this root was extracted, instead of breaking off at right angles, it split at an angle, and the cementum remaining not only regenerated sufficient tissue to cover that portion of the root that had been stripped of its cementum, but a third more. Dr. Fletcher has recorded a case in which the crown had been broken off in an attempted extraction, and the cementum had not only grown over the dentin but also had partly filled the canal. In this case, too, the cementum which had grown over the dentin was much thicker than normal. These cases seem to show that we may expect a restoration of tissue to a great extent, if not entirely, provided the conditions governing such a growth are ideal. This means that the new cementum forming must be removed daily or weekly in the overzealous use of scalers and files, nor must the healthy cementum and peridental membrane be removed. To get something, something must be left. The regeneration of the cementum must be the result of stimulation, brought about by the careful use of the affected teeth, and there must be an active blood supply. This can be encouraged by careful but not too diligent massage, and the absence of stringent mouth washes. The teeth must be cleaned, not merely brushed.

The bacteria commonly found in pyorrhea are constantly present in the mouth. If oral hygiene is a common practice with the individual, their numbers are greatly lessened; if not, they become very abundant. A person can go for years with ill fitting crowns and maintain an ideal condition for the development of pyorrhea. That is resistance; and when it is lowered, pyorrhea follows quickly. As long as he maintains that resistance, he is immune; but as soon as it is lowered, pyorrhea overtakes him. In order to recover, that resistance must be returned; otherwise the pyorrhea will only be kept in check, never cured. To prevent the formation of tartar deposits, after they have been removed, Epsom salt is most proficient. It might be said that constipation plays an important part in the formation of these deposits, and should form the sort of index in cases of chronic constipation.

There are a great many pathologic

conditions which have or are supposed to have their origin in mouth infections, of which pyorrhea is a common and important one; but it must be remembered that there are lots of people with arthritis who are wearing full upper and lower dentures and have been so doing long before they became afflicted with arthritis. There are a great many cases of arthritis that have their foci in the mouth, but these infections are sometimes present in cases of arthritis, the removal of which does not result in the disappearance of arthritis to any degree. In these cases, therefore, while there may be pyorrhea and other foci of infections present, and while every effort must be made to eradicate them, we must not devote all energy to these infections to the exclusion of foci in other parts of the body which may be the chief foci, and relief cannot be had until they are located and removed. Further, there are many roentgenograms which show rarefied areas around the apexes of the roots that are rightly interpreted as being foci of infection, but it must also be remembered that there are lots of others which show the same rarefied areas which are not foci of infection, being localities in which there possibly once was a focus but which has been removed, and the tissue not yet completely filled in, which may never completely take place. This is amply proved by using an aspirator and removing a portion of the content of that supposed focus, only to find it to be nearly free from bacteria. Except in extreme cases, therefore, there is no justification for the extraction of a tooth, simply because a roentgenogram showed a rarefied area, unless substantiated by other diagnosis. The extraction of teeth, in an effort to check infections in other parts of the body, just because a roentgenogram showed a rarefied area, except in extreme cases, is to be condemned. If this practice is to be indulged in, it must have its completion in the extraction of all devitalized teeth whether or not the Roentgen ray shows a rarefied area to be present. Also all teeth that are pyorrheic would have to be extracted because they are foci of infection, and those that are not yet affected would have to be extracted because they might become foci of infection.

THE ETIOLOGY AND TREATMENT OF INTERSTITIAL GINGIVITIS.*

By Eugene S. Talbot, M.D., D.D.S., Chicago, Ill.

My researches on interstitial gingivitis and pyorrhea alveolaris[1] were published in book form in 1899. In this work every conceivable phase of the disease was studied on animals as well as man. The pathology was beautifully illustrated from its beginning to the formation of abscess, on the one hand, and exfoliation of the teeth, on the other.

The object of this paper is to try to make clear the etiology, pathology and treatment based on the researches laid down in my work.

The tissues about the roots of the tooth may become diseased under extreme local irritation or from constitutional disease, but as a rule the progress of tissue building about the first and second set of teeth prevents tissue degen-

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[1]Talbot, E. S.: Interstitial Gingivitis or So-Called Pyorrhea Alveolaris, Philadelphia, S. S. White Dental Manufacturing Company, 1899.

eration. Not until the bone has obtained its growth, from 27 to 35 years of age, does degeneration take place to any great extent, altho marked inflammation of the gums may be present. When the alveolar process has obtained its growth about the second teeth, the bone may be said to have reached the senile stage, and absorption under favorable conditions begins.

THE ETIOLOGY.

In considering the etiology of interstitial gingivitis, my researches have shown that the tissues surrounding the roots are end-organs, owing partially to the fact that the teeth, so far as nerves and blood vessels are concerned, are foreign bodies, and partly to the end-structure of the bone. An end-organ is a structure in the body in which nerves and arteries extend to the extreme end and then stop. The veins extremely sluggish, the blood containing poison remains, and, being unable to return, sets up a low form of inflammation. The dental pulp is the best example of an end-organ in the human body. A study of this structure under the microscope, of persons over 40 years of age, will reveal all the degenerative pathologic conditions possible.[2]

The blood, then, which flows into the alveolar process, owing to local irritation about the gum margin or root of the tooth, does not return into the circulation. Blood charged with metallic, drug or body poison collects in the alveolar process and produces irritation. Stasis results (Fig. 58, Interstitial Gingivitis[3]), nutrition is cut off, and a low form of inflammation is produced. Nerve end degeneration takes place, endarteritis obliterans, and arteriosclerosis occurs.

Ziegler[3] says:

"The causes of inflammation may lie either in mechanical, thermal, electrical or chemical influences, as well as in the influence of parasites. The common characteristic of all these injurious agencies is the production, in the first place, of a local tissue degeneration, which, when of a certain extent and intensity, is associated with disturbances of the circulation and of vascular secretion."

This exactly describes the condition found in the alveolar process. Stasis of blood in interstitial gingivitis is, then, due to mechanical irritation and possibly chemical changes in the blood.

Ziegler[3] again says:

"Under the designation inflammation are grouped those pathological processes, consisting on the one hand of tissue degenerations and tissue proliferations, and on the other, pathological exudations from the blood vessels."

In this particular form of inflammation, tissue degeneration takes place. There is no pain, heat or swelling as observed in the other forms of inflammation.

When we consider the peculiar endotransitory nature of the alveolar process, degeneration of tissue is the natural result. At the senile period when the excretory organs are diminishing in activity and in disease, vital resistance is at its lowest ebb, metabolism is diminished, and degeneration and absorption of the alveolar process is in active operation. As age advances, the destruction of bone is a natural normal pathologic process.

The disturbances in circulation bring about tissue degeneration because the gingival border of bone is very thin, transitory and easily destroyed. The action of this mechanical irritation is to produce artery changes, nerve end degeneration and absorption of bone about the arteries, called halisteresis. Stasis of blood may take place in a circumscribed area, or on the entire border of the alveolar process; or the apical end of one or more roots may be involved. This depends on the nature and quality of the irritant. The nature and severity of the irritation, stasis of blood and a lowered

[2]Talbot, E. S.: Developmental Pathology, Boston, Richard G. Badger, 1912, chapter on the dental pulp.

[3]Ziegler: General Pathology, p. 314.

vitality of the patients will also determine the extent of the destruction of tissue, whether the irritation is located at the apical end of the root, midway between the apex and the cervical margin, or at the cervical margin.

When the inflammation has once become established at the cervical margin, the absorption is progressive to a greater or less extent until the tooth or teeth are removed. Owing to the transitory nature of the alveolar process when irritation and stasis of blood occur, the nutrition of the part is interfered with and the bone tissue may be partially or wholly destroyed, leaving the fibrous tissue (trabeculae) undisturbed, thus holding the tooth firmly in position, altho it can be moved laterally by the fingers. In most cases, however, the entire structure, including the fibrous tissue, is destroyed.

My researches have shown that the deposits on the roots of the tooth, other than tartar, are the detritus of destroyed bone and not deposits from the blood, as was formerly supposed. The pus stage is an after-consideration, and has nothing to do with the disease.

In summing up the etiology, then in this disease: 1. We have to contend with the bone as an end-organ in which the blood accumulates (stasis). 2. Stasis of blood cuts off nutrition. 3. Local and constitutional irritation and chemical changes in the blood set up a low form of inflammation and bone absorption. 4. The absorption is enhanced because of the transitory nature of the alveolar process. 5. Nerve end degeneration and arteriosclerosis occur. 6. Want of vital resistance assists absorption.

LOCAL TREATMENT.

The first symptom of interstitial gingivitis is bleeding of the gums on the slightest injury. The classification of the different phases of the disease renders the treatment, so far as we are capable of directing it, simple and easy.

The first thing that naturally comes to the mind of the operator is to remove the cause. The local treatment may begin immediately. For personal reasons of cleanliness of the patient and the operator, one or two applications of iodin should first be made to the gums, which will destroy the germs and cleanse the mouth. After this has been accomplished, the removal of all local irritation may begin.

We have seen that stasis of blood cuts off nutrition, causing degeneration of tissue (absorption of bone). **The main object to be obtained in the treatment of this disease is to remove the stagnant blood, reestablish the metabolic process and cause a normal flow of fresh blood to nourish the parts.** The nutrition of the part must be renewed that Nature may restore the tissues to health.

How shall this be accomplished? To remove congested blood, physicians, from fifty to a hundred years ago, resorted to cupping, leeches and scarifying the tissues. These methods must be resorted to at the present time in treating this disease. If the gums are congested and festoons hang down between the crowns of the teeth, they may be removed on a line with the alveolar border with a lance.

The gums should be allowed to bleed as freely as possible. In removing the deposits from the roots of the teeth, the parts may be injured as much as possible with as little pain to the patient as possible, the germs having first been destroyed. In this way much of the congested blood can be removed.

The suction process, not unlike the old method of cupping, is excellent when properly performed.

Scarifying the gums is also a good method of procedure. Vigorous gum massage with a stiff gum massage brush should now be employed to stimulate the tissues to healthy action.

Before the operation and after bleed-

ing, iodin should frequently be employed to destroy all germs in the mouth. All loose teeth should be removed.

The following preparation has been used since 1878:

Water	10 parts or grams.
Zinc iodid	15 parts or grams.
Iodin	25 parts or grams.
Glycerin	10 parts or grams.

The iodin destroys all germs in the mouth and cleanses the tissues. The zinc iodid is used to contract the tissues, the glycerin to assist absorption. This preparation is applied to the gums, teeth and mucous membrane by a long, slender applicator with cotton wound about the end. It should be applied as often as every other day if possible. It is not to be used by the patient.

Friction and stimulating methods must be employed by the vigorous use of a "gum massage brush." The brush should be so shaped that it will reach the festoons between all the teeth.

It should be made of the stiffest unbleached bristles that can be obtained. The brush should be inserted into the mouth, the mouth and teeth closed. In performing this operation the mind should be concentrated on the gums and not the teeth. When the tissues have become revitalized, deposits from the alveolar process on the roots of the teeth will cease to form.

One of the best gum washes for the patient to use in connection with "gum massage" is that of the zinc sulphocarbolate recommended by Dr. W. H. Whistler of Cleveland. This drug may be used in different strengths and in many forms. The following is a combination which I use:

GUM WASH.

Zinc sulphocarbolate	60 grains
Alcohol	1 ounce
Distilled water	2 ounces
True oil of wintergreen	8 drops

The patient should use this gum wash and massage the gums three times a day. The patient should be under the care of the operator at least two or three times a week, so that he may direct the treatment. The treatment of interstitial gingivitis at the apical end of the roots must be carried out according to symptoms.

CONSTITUTIONAL TREATMENT.

While the local treatment is being conducted, the patient's general health should be inquired into. A twenty-four hour sample of urine should be obtained, and a thoro laboratory examination made. If there are casts and high acidity, and indican is abundant, meat should be excluded, the patient placed on a vegetable diet, and the acidity reduced. The bowels should be kept open and large quantities of water consumed. There are many methods of cleaning the system and bowels. The following may be used to good effect; a teaspoonful in half a glass of warm water every four hours:

Calcined magnesia (heavy)	½ ounce
Sodium bicarbonate	1½ ounces

If the patient has sugar, albumin or other complications, it is best to refer the patient to a physician for general treatment.

By this method of treatment the patient, in the estimation of the average dentist, is cured, not, however, as other diseases of the body are cured. Eternal vigilance is necessary on the part of both operator and patient to prevent blood from again collecting in the blood vessels of the alveolar process, and a return of the disease.

The bone is still an endotransitory structure, and having once become diseased, it is much easier for the stasis of blood again to take place. As the patient advances in years, the excretory organs become senile, poisons collect in the blood, resistance is lowered, and there is a gradual absorption of bone taking place about the teeth thruout life.

ABSTRACT OF DISCUSSION

On Papers of Drs. Lescohier, Potter, Rhein, Harris and Talbot.

Dr. Arthur D. Black, Chicago: The first most outstanding feature of the pathology of this group of diseases is their chronicity and this has possibly contributed much to the difficulty of a clear understanding of the pathology. This condition, which I will term a chronic suppurative pericementitis, will, in the average case, be progressive extending over ten, fifteen or even thirty years. In those cases where we have a systemic cause as the principal one, we would naturally expect to find a general involvement of the peridental tissues. Except for some added local exciting cause, there is no reason why one or a few teeth should be picked out; all of the teeth should be included in the manifestation of the disease where the systemic condition is the principal cause. On the other hand, in those cases where a limited number of teeth are involved, we would naturally expect to find that the local exciting causes had played the primary role. As to the bacteriology, many men have endeavored to find a specific organism which could be associated with this disease, and they have failed. One fact argues against a specific organism as being the cause, and that is the progress in these pockets, and this progress is very much more rapid toward the apexes than laterally around the roots. We observe many cases in which from an original pocket there have developed a number of other surface pockets, without any involvment of contiguous surfaces of the teeth. The tendency is for a tooth to move away from the side of the pocket, because encircling each tooth are the fibers of the peridental membrane. These are on a tension, and when the tissue is destroyed on one side of the root the balance of those fibers is lost, and the fibers of the opposite side draw the tooth in that direction, unless some obstruction of occlusion prevents this. There never is a detachment of the peridental membrane alongside the root that is not preceded by a gingivitis. In the destruction of the tissue about the root one of the earliest manifestations of the presence of a pocket alongside the root is a stripping off of these tissues from the cementum. As time passes there is left a connective tissue which has nothing which may differentiate it from a general connective tissue. Those elements which are necessary to normal reattachment of tissue to the tooth are lost. What else has happened? The cementum has absorbed the products of that suppurative process. It has been charged from a positively chemotactic tissue into a negatively chemotactic tissue, which will repel tissue attachment.

As to rebuilding of the cementum: I have examined many cases and seen many in which there has been an absorption, not only of the cementum, but of a considerable portion of the dentin of the tooth, but I have never seen any in which there was a detachment in that area. They were not infected cases; there had been no suppuration. They were not cases in which, if you leave the end of a root, you will find cementum building over it. Dentin has no power of rebuilding cementum. Some one said it was closely comparable to bone. It is, except that it has no circulation. Its life depends on the cementoblasts on its surface. No changes take place within it. As the pocket progresses farther down the side of the root, we must expect the first absorption of the alveolar process to take place near the crest, and then as it continues around the root, in cases of long standing we have a funnel formation in the bone. That is one of the marked symptoms of progress of this disease. I would like to criticize Dr. Potter's use of

the term erosion in connection with these destructions or absorptions of the bone. It seems to me that the term rarefication is hardly applicable to these cases, because the bone, is either destroyed or absorbed. Dr. Potter spoke of looseness and tightness of some of these teeth. Many times we have a very loose tooth, so far as motion is concerned, and yet it is difficult to extract. As a result of inflammation, the fibers of the peridental membrane which remain attached to that tooth have lost their tonicity; they are not taut, and are apparently lengthened considerably, so that the tooth has an excessive motion, which does not at all compare with the amount of destruction of tissue which has occurred. Treatment will tone up those fibers and they will again exert their normal pull.

Dr. Floyd D. Leach, Chicago: There is a certain amount of tooth movement laterally, that is, from buccal to lingual. Dr. Black said something about a peculiar action of the micro-organisms which caused a destruction of the investing tissues of the teeth, especially along the proximal surfaces of the roots. We have all seen this condition, causing the breaking down of the contents, due to the lateral motion in the act of mastication. It is not easy to guess or feel quite sure that those fibers of the peridental membrane which die to the buccal, labial and lingual sides of the socket should take the mechanical strain. I have an idea this condition may be the reason why the progress of the destruction is more pronounced on the proximal surfaces of the roots than on the buccal, labial and lingual. You have always noticed that the pockets are really on the interproximal surfaces. The gum would recede from the lingual, labial and buccal surfaces of the roots, and still in a great many cases very firm as to attachment. Food substances constantly massaging these areas, and the friction of the brush when a brush is used in cleansing the gums and teeth stimulate to a greater extent those areas on the buccal, labial and lingual surfaces. But I think the mechanical arrangement of the fibers adds more resistance, more tone and more strength to these buccal, labial and lingual vestiges.

Dr. Russell W. Bunting, Ann Arbor, Mich.: We have been told by some that pyorrhea is the result largely of constitutional factors, and by others that pyorrhea is the result of local disturbance, such as infection and irritation. Almost all have agreed that very frequently there are combinations of these two. May I present this view of the situation? May we say that pyorrhea is caused by an exciting condition, such as the infection which destroys the tissues about the teeth and severs their attachment? But infection is not the determining cause? The determining factors are all the predisposing causes, either local or general, which make the characteristic action of the exciting causes possible. I like Dr. Rhein's statement that healthy tissues cannot be infected. How often have we seen ten times the local infection that would be necessary to produce pyorrhea existing in the mouth, and no pyorrhea present? Why? Because those tissues were so healthy that they were not infected, even under very untoward local conditions. If this is true, we must recognize not only the local but the general conditions as causative factors. As Dr. Rhein said, our constitutional factors are often so obscure that the ablest and most careful internist cannot detect where they are located, or what their nature is. The infective condition alone which is present in the mouth could not have produced the pyorrhea in such cases but for that remote constitutional condition which made it possible for this to happen. Fortunately, we find that very frequently the clearing up of the local causes allows the tissues to come back to an apparent normality.

Can we cure pyorrhea? I have taken the stand that we cannot cure pyorrhea unless we can obliterate the pockets. Dr. Harris said that the pocket may be obliterated because cementum is built on the denuded surface, and that new attachment is had to the tooth. Dr. Black does not believe that pyorrheic teeth can ever have a reattachment. We must admit that if pyorrhea is to be cured absolutely, either the soft tissues must be reattached to the tooth completely up to the free line of the gum or else the gum line must be retracted down to the place on the root at which it is attached. If it is true that these tissues can never be reattached, why should we not treat pyorrhea by opening the pockets, cutting away all overlying tissue, clear down to the bottom of the pockets, exposing the healthy tissue and allow it to heal? We would then have obliterated the pocket and the pyorrhea. But is that the only way in which it may be done? It is my conviction that the tissue may be made to physically join to the surface of the root after they have been denuded from it in the formation of a pyorrhea pocket, if the conditions are right. I have had many specific instances of pockets, in which I could get one-quarter, one-half or three-quarters of the length of the root with an explorer, or any other instrument, and at the conclusion of a month or two of surgical treatment, assisting the tissues to return to as near the normal as possible, I have been unable to get the finest instrument between those soft tissues and the root of the tooth in the identical place where the pockets had existed previously. What has taken place in those pockets? Are there any other two tissues in the body that would so approximate and still not be physically attached? I do not think so. Let us take a surface view of that pocket. Pyorrhea seldom goes down circumferentially, attacking the tissues equally. It rather goes down one surface. If we prepare this root surgically and make it clean, we have remaining on either side living, healthy pericementum, which is capable of reproduction and filling in the space with new tissue. This is laid down first in the form of granulation tissue from which tissues may develop having the propensity to form a bony-like material, or even true bone, which may be deposited on the surface of the root, and attach those primitive fibers, or embryonic type of transitional tissue, to the surface of that root. When a root is resorbed there is in many cases entire breaking up of the fibers. The bone is entirely taken out at a given area and only a transitory type of tissue remains. Dr.Black said that in one case the destruction was not infective and that in the other it was. But was it not destroyed in both cases and what is the difference? There are cases on record in the literature in which a bone has been cut across; a section has been taken out, and in the gap there has been placed an ivory bit that reproduced as nearly as possible the bone which was removed. Later that section has been removed and has been examined in microscopic section. It was found that the ivory had about it a layer of new bone which was quite like a lamellar bone placed on the outside of the ivory. Outside of the bony layer a soft tissue formed, quite like periosteum. These tissues had adapted themselves to form a direct attachment of soft tissue by a bone forming process to the ivory, in which there was no circulation, without which Dr. Black stated reattachment could not occur. We are told that exactly the same thing has been done with platinum in which bone has been laid on top of platinum, and the soft tissues glued to the platinum in the same manner.

Dr. Eugene S. Talbot, Chicago: I conceive an entirely different condition of things than has been explained to you by Dr. Black and Dr. Bunting in regard to pockets. There is no question about

the pathology. It is all laid down in my work, and has been verified in a great many different methods of experimentation. My own researches explain that many of the statements, made by Dr. Black and Dr. Bunting, are much more simple than the points brought out by them. For instance, arteries run thru the alveolar process and the peridental membrane. When irritation takes place, whether local or constitutional, the artery is filled with irritation. If constitutional, it may be poison; if local, it may be anything that produces a local irritation. If you will examine the illustrations in my book, you will find that the bone extends around the artery. The irritation, then, is set up in and around the artery, and if there are a dozen arteries there are a dozen points of irritation, inflammation and absorption, and the absorption starts out from the artery. We will say that this irritation is due to lead or mercurial poison. That material is carried down into the artery, and it may extend clear to the end of the root. What has taken place? Absorption has taken place around that artery, and only one artery is involved. Absorption has gone down to the end of the root. But if the irritation is greater, either constitutional or local, these arteries passing in a lateral direction, as well as those passing longitudinally, may absorb the entire process on the one side of the tooth, while absorption has taken place downward in the other case clear to the end of the root in one or two arteries. To explain Dr. Bunting's point about filling up of the alveolar process with new material if the inflammation has extended down the side of the root, with one, two or three arteries involved, the bone is liable to heal up if the cause is removed. If, on the other hand, the bone has been entirely destroyed downward and pockets have been formed, that bone is never restored, because the fibrous tissue is entirely lost. Bone absorption takes place by halisteresis before the fibers of the peridental membrane are destroyed—just the reverse of Dr. Black's idea.

Dr. Meyer L. Rhein, New York: Not a thing has been said in regard to cemental repair that can be denied under certain conditions, and yet we have listened to statements that appear to be absolutely in opposition to each other. I know that Dr. Bunting is correct in what he has said. I know that exposed cementum can be repaired and the normal condition replaced, but each of the speakers has omitted to state in what conditions repair, or lack of repair, takes place. Dr. Talbot gave a very lucid description of what takes place in the tissue when arteriosclerotic conditions manifest themselves. We get these conditions in certain forms approaching the period of senility, in certain forms of malnutrition, nephritic and diabetic conditions, and under such conditions that repair of the kind that Dr. Bunting spoke of is impossible. Why does a pocket form? We get a pocket on account of imperfect nutrition to that particular spot, and as a consequence there is the impossibility of repair which must ordinarily take place thruout the body daily. The same conditions that produce pyorrheal conditions are at work in erosion, where there is found a continuing loss of gum tissue, exposing the root surface, except that the local resistance, due to many causes, has prevented infection from taking place. In other words, in the retraction of the gum which results in the exposure of considerable of the root surface of the teeth, we meet with the same lack of nutrition that is demanded at every ultimate point of nutritional circulation. Pyorrhea may occur in people suffering from fatty degeneration about the heart. What are the appearances of the mouth in this condition? There is no suppuration. There is no deposit on the roots, but very extensive pockets that frequently go down deep, and we find the gum in ribbons over these pockets. They are

great big flabby pockets, with a deterioration in color and character of the circulation. I have never seen one with any purulent condition. I have seen those gums come back absolutely to what we would consider comparatively healthy gum tissue under the Nauheim treatment. If the malnutritional factor has disappeared after treatment, you may call that patient cured. What is the reason that exposed cementum, considering that there is no condition of malnutrition present, will not permit the tissues to recover? It is due to the fact of exposure of this cemental surface to the irritating fluids that are in circulation. I believe it will take exceptional conditions to permit a cemental surface that has suffered abrasion to repair, because of the danger of retrograde metamorphosis going on from its exposure to the fluids of the mouth, consequently the therapy must be of such a mechanical nature to cover that cementum that it will not be exposed to the fluids of the mouth. I have done this for many years by coating the surface of such cementum with chloropercha, keeping the exposed cementum hermetically sealed and thus protecting it from the fluids of the mouth.

Dr. George B. Harris, Detroit: I have been misunderstood a little in regard to the regeneration of cementum. In the first place, I do not wish to be understood as saying a complete regeneration takes place. The point I wanted to bring out is that there are cases in which the cementum has regenerated, and these cases were not under aseptic conditions. Can anybody imagine the crown of a tooth cut off below the gingival margin or split half the length of the root with the cementum forming over it, and say that this portion was in an aseptic condition? I do not believe it. Further, where the cementum is diseased we can remove it, leaving nothing but the healthy cementum below, producing a condition that is as near aseptic as it is possible to get under the conditions, a condition at least equal to those mentioned where the cementum did reform. It is possible, then, that the cementum will reform there. Whether it ever has or not, I do not know, because there is no way of measuring it as it takes place in the mouth, unless you would happen to find a tooth where the difference in density of the cementum will show, or where it would be shown by the new cementum making a thicker coating.

Dr. G. H. Smith, Medina, O.; This subject of pyorrhea has been of intense interest to me for five years, and I would like to suggest to the medical profession that they advise more of their patients to select an ethical dentist. Dr. Moorehead made a statement in his address that I can hardly substantiate. He claims that only 10 per cent. of the dentists were efficient. There are dentists commercializing, but with the cooperation and advice of the medical profession many patients would escape many dental disorders.

Dr. William C. Fisher, New York: I want to ask Dr. Rhein if I understood him to say that in a diabetic patient he would not consider operative procedure as being wise, or that it had been known to even be fatal?

Dr. Rhein: Correct. I said diabetes not under control.

Dr. Fisher: I am not thoroly convinced that a dental operation is precluded in any patient—diabetic or otherwise—who is able to visit your office and go about his business. I believe, of course, in the medical treatment, but I certainly think that there is absolutely no shock, such as that experienced in a major operation while treating these patients. In pyorrhea I use the several solutions of iodin. Dr. Talbot spoke of gum massage with the brush. Do you mean the hand or engine brush?

Dr. Talbot: The hand brush.

Dr. Fisher: I was afraid that possibly you meant the engine brush. In polishing teeth we want to get away from anything that will in any manner injure or tear the tissues, and I have devised a simple little mandril of one piece of steel. I use French tubing of different sizes to fit; and make my polishing powder, mixing in with that iodin. As this mandril revolves in the engine, the French tubing will flare out on the surface and coax up the gum, whether receded or not, and polish the surface beneath the gingiva. In the interproximal spaces select a smaller piece of tubing, and it is possible to get a polished surface there. With that method you get a massaging of the gum which the patient cannot possibly give it. You are massaging the gum at the same time that you are polishing the neck of the tooth where it has been scaled.

Dr. W. A. Price, Cleveland: Two decades find us almost exactly where we were when I started to practice dentistry twenty-three years ago. We cannot come together and express a common idea relative to the etiology of pyorrhea and be united in supporting and substantiating it. We have made practically no study whatever of protein absorption, which takes place around these pyorrheal infections. A large number of nervous lesions of the body have apparently been traced directly to dental infections and to pyorrhea. The medical profession must bring these patients back to us for treatment, and we cannot even give the A. B. C. of the infection in pyorrhea. We do not know the nature or the morphology of 50 per cent. of the bacteria that grow in pyorrhea pockets. They have not been grown artificially. What is the solution? If I were to ask Dr. Talbot how he got his information that has been the great cornerstone for a large part of his work he would say, "Hours and hours, and days and days, and years and years of hard work." How many men are devoting a worthy effort to this work? We are called on to redouble our efforts to answer with some degree of intelligence this great question of the etiology of pyorrhea, which today we know almost nothing about.

Dr. Hollis E. Potter, Chicago: I can see now that the pockets we are showing with the Roentgen rays represent more absorption of bone than any such slight detachment as you have been talking about. I should think that in cases where we are showing Roentgen ray findings of absorption around a tooth, when we are talking about a pocket, it is a very gross condition as compared with the small and limited pockets that the controversy is about this afternoon.

Dr. Alexander W. Lescohier, Detroit: As Dr. Price said, it is possible that there are many good things we do not know about the bacteriology of pyorrhea, but there is one fact which I do believe has been established, namely, the preponderance of streptococci infection. I do not mean to imply that the streptococcus is the cause of pyorrhea, bacterial infection being apparently a secondary element, characteristic of the pustular stage and not of the initial condition. But, in view of its potential virulence and the persistency with which the streptococcus is found, it is indicated that certain strains have a peculiar affinity for the peridental tissues. Also that as far as the sequelae of pyorrheal infection are concerned, particularly the arthritic, the streptococcus overshadows in importance other microorganisms.

Dr. H. A. Potts, Chicago: May I ask if it has been determined whether or not this streptococcus which he finds in pyorrhea is an aerobic or an anaerobic one; whether hemolytic or the **Streptococcus viridans,** and what connection there is between the effects of these streptococci of pyorrheal infection and those found in chronic abscess?

Dr. Lescohier: I cannot answer definitely the questions raised. The work of Hartzell and others has indicated that the **Streptococcus viridans** is found much more frequently than any other type, but hemolytic streptococci are also observed in some cases. I would not undertake to answer the question as to the relationship between streptococci elsewhere and those in pyorrhea and alveolar abscess.

Dr. Meyer L. Rhein, New York: I do not want to let the inference go that I am oblivious to the fact that it is necessary to have an attacking organism when we come to this stage of infection. There seems to be a strong elective affinity of certain micro-organisms, to attack the gingival tissue dependent on certain malnutritional predisposing causes. There is a type of pyorrhea due to certain kinds of malnutritional causes where the attacking organism is a protozoon. I have cured three distinct cases of pyorrhea in the last two years with emetin, and I failed in numerous other cases. Now, why should this be? It simply carries out in the ultimate analysis what Dr. Lescohier's paper has shown us, that there is no one specific organism in pyorrhea. The three patients I cured all seemed to have the same kind of malnutritional predisposing causes; they were all cases of intense inflammation and infective conditions in the larger colon. They were cases that had shown symptoms that very closely resembled epidemic forms of dysentery. Now, is it illogical, is it surprising, that in a condition of that kind, where we know the endameba plays the role of attacking force, that when by reason of this predisposing cause the mouth shows the evidence of pyorrhea we should find the same organism again the attacking force? The place to find pyorrhea is not among the patients who come to the office of the dentist. You will find pyorrhea almost everywhere. About 85 per cent. of the cases that the average dentist treats as pyorrhea are nothing more than some focal infection that has been diagnosed improperly and in which a roentgenogram would demonstrate the error of the diagnosis. In chronic alveolar abscess, with its sinus opening out into the mouth, sooner or later symptoms appear that approach and grossly deceive the careless diagnostician, and there is no reason why you cannot get an alveolar abscess with a pyorrhea complication, if you want to call it such, that is dependent entirely on the apical infection. I have found such a condition in a considerable number of cases. On careful differential diagnosis I could put my hands on the point of focal infection. That is especially true in cases where there seem to be one or two teeth only subject to pyorrhea. When an individual comes with a pyorrhea in one or two teeth, the diagnosis is open to grave suspicion. I have found the focal infection of a pyorrhea showing in an upper incisor, away back in the roots of a second molar, and I recall quite well the difficulty of making a diagnosis in that particular case. I was a little surprised at Dr. Fisher's question as tho I was in doubt as to whether operative interference was to be avoided in diabetics where the diabetes was not under control. It is not a question of a major operation that makes a surgical condition a most dangerous proposition under such conditions. I know of no surgeon who would not seriously hesitate to do the most minor surgical operation on a patient showing a large percentage of sugar. It is true that under certain conditions, when it becomes a question of life or death, the surgeon will take chances. He knows the patient is going to die from septic causes, and he is going to give that patient the benefit of that chance. The deaths from teeth extraction in diabetics would fill a very large chapter if they could be brought together.

Dr. Fisher: Does that mean from the anesthetic?

Dr. Rhein: No. I am simply stating

what is an abstract fact that is settled in the minds of surgeons, pathologists and bacteriologists at the present time. In regard to research work: We have had to have recourse to animal experimentation to a large extent, and I am convinced that all the dental research work on animals in the past is replete with error, because the mouth flora of the dog is so different from the mouth flora of the human that it cannot consistently be taken as the same in any experimental work on animals. This is a very important factor, and it is far better for dental research work to proceed slowly and get results that are not going to be questioned in the future than to make comparisons and arrive at conclusions that cannot be verified.

Dr. Eugene S. Talbot, Chicago: If you will examine the dental journals, and some of the medical journals, you will find that a large percentage of the pictures that have been shown are represented as abscesses. Dr. Potter has shown us that there are a great many different shades or conditions of the alveolar process which are not abscesses, and the reason for that is that we have a condition of absorption called halisteresis, and not lacunar absorption in the alveolar process, which may be or is due to the irritation that has taken place from the pulp chamber. The degree of absorption will depend on the amount of irritation. In regard to focal infection the dental profession can hardly be blamed for abscesses at the roots of the teeth after the canals have been treated and filled. Up to within the last two or three years, when an abscess formed on the root of a tooth and the face swelled or a fistula had formed, the only means of knowing that the abscess was supposed to be cured was that the face became reduced to a normal state and remained so; the fistula healed and did not return. These were the only symptoms available when the tooth remained quiet without pain or swelling which led the operator to believe that the abscess was cured. With the modern methods of diagnosis, the Roentgen ray, we have learned that these signs are not for a moment to be considered. The Roentgen ray demonstrates that very few abscesses are destroyed and healed, but that they remain cold or blind abscesses, discharging pus into the tissues for an indefinite length of time. I recall one instance in which an abscess remained on the root of a left superior first molar for fifty-two years.

Dental News

CONNECTICUT.

The Hartford Unit No. 1 of the Preparedness League of American Dentists is still doing a great work for the recruits for the Army. We are in direct contact with the recruiting officers in Hartford, and no men are rejected on account of defective teeth. We are also forming a Dental Corps detached of the Home Guard, and it looks like a company of seventy.

DR. B. A. SEARS,
847 Main Street, Hartford, Conn.

COLORADO.

The President.—This is a great age in which to live. Things that transpire in a day are looked upon in surprise and then accepted as common place and are put to use. We speak of industries making such wonderful strides and of war equipments as beyond comprehension, but do we stop to think that of the great improvements in our own line of work. Do we stop to think that ten or fifteen years ago it was a dream to think of such an institution as the Forsyth Infirmary? And to think of such donations as Eastman and others have given.

These are facts, and while the donors are wonderful personages to help the public, yet, back of it all are the society members of our Dental Association thruout the country. What man in the country could have gone on with these enterprises without a "society trained" dentist? Thus it is a plain fact that each and every one of us helps in his way to aid in the progress of our profession and to the health of humanity.

Each meeting we attend sends us home well repaid for our time and the small dues necessary to keep our association together. Now let us consider these facts and be grateful we have a society and are members thereof.

Your officers are working hard to please you and we need you at our meetings to make them a success.

Just think this over and be with us next June at Glenwood Springs.

F. P. WELLS.

The Secretary.—January first The Journal of the National Dental Association became a monthly magazine instead of a quarterly as heretofore. The valuable ideas and reports contained in its pages come to your desk twelve times a year instead of only four. As most of you are already aware, this desirable change was made possible by increasing our national dues $1.00 per year, so that now we pay $2.00 to the National and $2.00 to the State Associations; total $4.00. A portion of this increase also goes into the Research fund. Does any other investment pay better dividends than does your dues to the Colorado State Dental Association?

To those in arrears the above is a reminder to PAY UP so that you will miss no more. (It is not too late to get the back numbers.) To those now in good

standing it is a suggestion to send in your check for 1917 before you overlook it. The official receipts for 1917 are now ready—price $4.00 each. Several already have theirs.

Here's a bet for your sporting blood. Not ten per cent. of our membership will pay attention to the above. Now make me pay up.

EARL W. SPENCER, Sec.

ILLINOIS.

Vienna, Austria, March 14th, 1917.

We Knew It.—Dear Bill:—Nothing of importance has transpired since I saw you at Springfield last year. Have you forgotten what a fine time we had? Well, they do say Quincy is going to show us a few things this year. How do I know? Why, I have been talking to one of the boys who lives there and he tells me they have about completed their arrangements for the May meeting and from all reports it is going to be a dandy. You see he belongs to the Quincy Dental Club and they are all working earnestly to make a big success.

Now, Bill, if you have made any other plans for that week you'd better change them right now, because this is something you can't afford to miss.

By the way, Bill, I understand special plans have been made for entertaining the ladies and providing for their comfort. There is to be an auto trip over the city and thru the parks with luncheon at the Country Club and a theatre party afterwards. This feature will be in charge of a special committee.

All these things sure look good to me —so here's hoping we may all be together in Quincy. Yours,

UNCLE HENRY.

INDIANA.

Resolutions Passed by the Wabash Valley Dental Society at Logansport, Indiana, April 4, 1917.—Whereas, our country is now facing the greatest crisis of its history, and

Whereas, hundreds of young men who are anxious to enlist in the Army are being turned down, because of the deficiency of masticatory apparatus and for the reason that they have not the means themselves to have proper dental services rendered to put themselves into shape to meet Army requirements, and the government having no facilities to take care of them, meaning a tremendous loss of available and worthy men, and

Whereas, thru our Preparedness League of American Dentists we have already made it possible for two thousand rejected men to enlist in the Army. Therefore, be it

Resolved, that we, by unanimous vote, pledge ourselves as individual members of the Wabash Valley Dental Society to prepare the mouths of at least two rejected men in the next thirty days, so that they may be able to enlist, giving preference over all other patients. Be it further

Resolved, that we will continue to do our professional duty to these rejected men, so that they may become efficient soldiers in our Army.

NEW JERSEY.

Preparedness—The Board of Trustees of the New Jersey State Dental Society at a meeting held on Monday evening, February 19, passed the following resolution:

Resolved, That the services of our members be tendered to his Excellency, Walter E. Edge, Governor of New Jersey, that in the event of war, or a call for volunteers, each member will place in perfect condition, without charge, the mouth of at least one enlisted man, or an applicant for enlistment.

A very courteous letter of thanks and appreciation was received from Governor Edge in reply to the resolution.

On the 21st of February the following letter was forwarded to each member of this Society, stating the action taken by the Board of Trustees:

My Dear Doctor:

In these days of preparedness, it seems

fitting that we, as dentists, should do our part. The Board of Trustees of this Society, at a meeting held Monday evening passed the following resolution:

Resolved, That the services of our members be tendered to his Excellency, Walter E. Edge, Governor of New Jersey, that in the event of war, or a call for volunteers, each member will place in perfect condition, without charge, the mouth of at least one enlisted man, or an applicant for enlistment.

This simply means that we would give a few hours of our time and a little material and labor to place in good condition the teeth, or if necessary, construct dentures for one enlisted man in our navy or army, or one refused because of defective teeth.

Surely not one of us would refuse to do this small part, and in order to be able to offer to the Governor the services of the members of this Society individually, as well as collectively, the enclosed card should be signed and returned to this office at once for filing.

Can we show an efficiency of 100 per cent. within a week? Your card signed and mailed today will help us make such a record.

Three hundred and seven (307) cards have been returned from the 515 members. Some have signified their willingness to take care of three; some five, and two of ten enlisted men. But where are the other 208? Surely we do not have that many men in our Society who are too selfish or not patriotic enough to devote the short time and energy required to do this small part for our State and Country. We would rather believe that those who did not respond failed to do so because of an oversight or neglect.

JOHN C. FORSYTH, Secretary.

For Our Country.—A goodly number of the men who seek to enlist in the Army and Navy are rejected because of dental defects.

There is a strong probability that this country will have to raise a large army in the near future. In such an event what greater good can the dental profession do than to place the teeth of applicants, refused because of defective teeth, in such condition that they may be accepted for service in the defense and in the maintainance of the honor of our country?

Surely, if men are ready and anxious to sacrifice positions, time, comfort and perhaps their lives, because their country needs them, and are barred from so doing because of lost or damaged teeth, the dentist who would not cheerfully do any reparative work that was necessary, gratis, could be classed only as a traitor to his profession and to his country. The New Jersey State Dental Society has asked its members to fill out a blank so that the Governor of the State may be apprised of the willingness of the dentists to do their share for their State and Country. If you have not already sent in your card do it now; for your convenience one will be found in the pages of this journal. It makes no difference whether or not you are a member of the State Society, if you will do your part, sign the blank and mail it to Dr. Forsyth.

If a call for volunteers for Army service is made, a list of local dentists will be sent to every recruiting station in the State; then do your duty.

Let US be ready.—*Editorial in the New Jersey Dental Journal.*

NEW YORK.

Brooklyn—Children of one of Brooklyn's schools peddled out one ton of peanuts and turned over the proceeds for the purpose of fitting up a dental clinic in their building. With this clinic the Board of Education has nothing whatever to do. It is owned by the children, the dentists who operate in it are paid by the children, who raise the money in some such manner as that described. In the peanut deal, every child who sold ten bags was given a button. One boy sold 150 bags. Every penny raised is turned into a common fund and every child in

the school is entitled to dental service free of cost.—*Northwest Journal of Dentistry.*

NEW MEXICO.

The new Board in the State of New Mexico that has just been appointed is as follows: E. G. Alger, Albuquerque; M. J. Moran, Deming; C. O. Harrison, Santa Fe; M. R. Chapin, Silver City, and L. R. Hough, Portales.

NEBRASKA.

In looking over our mailing list we find a lot of dentists who are not getting The Journal of the National Dental Association. They are not getting it because they are not members of our State Society. They got on the list by once holding membership in the Nebraska State Society, which has since relapsed because they have been sieged by the germ of inertia. We are not going to say that the State Society is the loser, nor that the National Magazine is the loser, but rather that those dentists and their patients are the losers. Dentistry is in an evolutionary state and is traveling at a "whirl wind pace" that it has never seen before. We have a National Research Commission who are studying our big problems and their findings are published in the National Association Magazine. The United States may boast other good magazines, but there is none the equal of the National. It was once a quarterly, it is now a monthly. You may secure it by renewing your allegiance to your district society. By so doing you automatically become a member of the state and national societies. Membership in the latter entitles you to its big magazine.—*Nebraska Dental Journal.*

OHIO.

The Rehwinkel Dental Society Unit of the Preparedness League of American Dentists was organized April 10th, 1917, at Chillicothe, Ohio. The Rehwinkel Society is composed of five counties and has one of the best organized component societies in the State of Ohio. This society expects to thoroly organize the entire membership in these five counties, so that every dentist may in this crisis in the history of our Republic, do his full professional duty.

C. W. MILLS, President,
Chillicothe, Ohio.

ARMY DENTAL CORPS.

National Guard Court-Martial.—First Lieutenant Lawrence M. Barnett, dental corps, Alabama National Guard, was tried at Fort Screven, Ga., March 9, 1917, on charges of drunkenness on duty, abscence without leave, and conduct unbecoming an officer and a gentleman. This officer was also tried at Fort Barrancas, Fla., on January 10, 1917, for being absent without leave and drunk in uniform. He was found guilty and sentenced to be dismissed by each of the courts-martial, and the sentences have been approved by the President. Lieutenant Barnett ceases to be an officer of the Alabama National Guard from April 6, 1917.—*Army and Navy Register.*

Dental Corps.—An examination of candidates for appointment to the Army dental corps will occur on May 7. Another examination will take place on July 2. There are at present fourteen vacancies in the corps, and there will be 22 additional vacancies on the 1st of July.

THE ARMY.

Base Hospitals for the Army.—In the news columns of The Journal of the American Medical Association is an account of the progress which has been made in the organization of base hospitals under the direction of the American Red Cross. Several points are worthy of mention in connection with this movement. The first is that for over a year the details of this movement have been going on quietly and without excitement or hysteria. When it is considered that thirty-four hospitals have

been organized and twenty-three of them completely equipped, that this involves the selecting, enrolling and training of over 800 physicians and surgeons and the selecting of a total personnel of nearly 7,000 persons, it will be realized that the medical profession has for some time been doing its share in the national preparedness movement. The function of these base hospitals should be clearly understood. They are not intended for operation in the cities in which they are organized, but are mobile units which can be sent on short notice to any desired location. They are not intended for operation in the field in close connection with troops or near the firing line, but are designed to serve as base hospitals, receiving the wounded from the field hospitals, as do the base hospitals in Europe. Probably fifty such units capable of caring for an aggregate of 25,000 sick and wounded soldiers can be completed with little difficulty. With such an equipment, in addition to the regular medical and surgical service in the army and navy and the various ambulance corps which are being organized, it is safe to say that the United States is today better prepared to care for the sick and wounded in any possible war than it ever has been before in its history.

FOREIGN—GERMANY.

German Teeth.—The teeth of German soldiers, as reported by Professor Palmer, of the Harvard Medical School, in a recent lecture, are nearly one hundred per cent. perfect. For many years Germany, with characteristic thoroness, has been caring for the teeth of its subjects, establishing clinics in the public schools and dental infirmaries in the smaller towns and villages as well as in the cities, and on the whole, making sure that no child, especially a boy, is allowed to let his teeth get into that state of decay which would necessarily cause his rejection at the time of a call to his colors.—*Good Health.*

GENERAL.

The First Diet Kitchen in Federal Army Base Hospital.—What is said to be the first diet kitchen in the Federal Army base hospitals was established as an indirect result of the hundred-mile hike last August of the Seventh New York Regiment. Many suffered from heat exhaustion and consequently from gastro-enteritis and intestinal indigestion.

When they returned to camp these men were unable to eat the regular rations, and in order to enable them to return to duty in the shortest possible time, the medical officer in charge of the camp, Dr. C. Perley Gray, established a diet kitchen, with most gratifying results.

Within twenty-four or thirty-six hours most of the men were enabled to return to active duty and restoration to health followed in a short time. The idea was later adopted at the base hospital.—*Good Health.*

Kahn Urges Conscription.—Representative Kahn, ranking republican member of the House military affairs committee, has strongly urged the passage of the administration's conscription bill.

"We should profit by Great Britain's terrible mistake," he said, "and not wait until the war is half over before we are forced to adopt the conscriptive system. In Great Britain with the volunteer system only the flower of the nation flocked to the colors."

Mr. Kahn pointed out that the slackers stayed at home. America should be wise enough now, he concluded, "to see the light."—*Army and Navy Register.*

Deaths

George A. Lowe, D. D. S., Rockport, Massachusetts; died at his home, May 23rd, 1916.

NATIONAL SOCIETIES.

National Dental Association, New York City, October 22-26.

National Association of Dental Faculties—New York City, October 19 and 20.

National Association of Dental Examiners, New York City, October 22-23.

STATE SOCIETIES.

May.

Arkansas—Little Rock, May 3, 4 and 5.

Illinois—Quincy, May 8, 9, 10 and 11.

Indiana—Indianapolis, May 15, 16 and 17.

Iowa—Des Moines, May 1, 2, 3 and 4.

Kentucky—Louisville, May 9, 10 and 11.

Massachusetts—Springfield, May 3, 4, and 5.

New York—Rochester, May 10, 11 and 12.

South Carolina—Columbia, May 8.

Southern California — Los Angeles, May.

Vermont—May 16, 17 and 18.

June.

Colorado—Glenwood Springs, June 21, 22, 23.

Connecticut—New London, June 14, 15, 16.

Florida—Atlantic Beach, June 20, 21 and 22.

Georgia—Brunswick, June.

Maryland—Baltimore, June 6, 7, 8. 9.

Nebraska—Omaha, June 4, 5, 6 and 7.

New Hampshire—Soo-Nipi, June 20, 21 and 22.

North Carolina—Durham, June 27, 28 and 29.

Pennsylvania—Philadelphia, June 26, 27, 28.

Tennessee—Memphis, June 19, 20, 21 and 22.

Utah—Salt Lake City, Hotel Utah, June 28, 29 and 30.

Washington—Tacoma, June 21, 22 and 23.

Wyoming—Cheyenne, June 12.

July.

New Jersey—Atlantic City, July 11, 12, 13.

Wisconsin—Janesville, July 10, 11, 12.

October.

National Capital—Chamber of Commerce, October 2.

Rhode Island—Providence, October.

November.

Arizona—Phoenix, November.

December.

Ohio—Cleveland, December 4, 5, 6.

NEBRASKA STATE DENTAL SOCIETY

The Nebraska State Dental Society will hold its 50th annual meeting June 4, 5, 6, 7, 1917, being postponed from the announced date of May 14, to 17, 1917.

HERBERT E. KING, Secretary,
446 Bee Building, Omaha, Nebraska.

NORTH DAKOTA STATE DENTAL ASSOCIATION.

The annual meeting of the North Dakota State Dental Association will be held in Fargo, May 15th and 16th, 1917. Good clinics and exhibits by manufacturers. All members of the National Dental Association or any State Society are cordially invited to attend.

SOLON CRUM, Secretary,
Fargo, North Dakota.

CALIFORNIA STATE DENTAL ASSOCIATION.

The California State Dental Association will hold its regular annual session for the year 1917 in San Francisco, June 6th, 7th, 8th and 9th. A cordial invitation is extended to members of other Associations.

For further information, and particulars regarding exhibit space, communicate with

JOHN E. GURLEY, Secretary,
350 Post Street,
San Francisco, California.

NORTHERN OHIO DENTAL ASSOCIATION.

The sixtieth annual meeting of the Northern Ohio Dental Association will be held at Hotel Statler, Cleveland, Ohio, June 7th, 8th and 9th, 1917.

An attractive program is being arranged and this promises to be one of the most interesting meetings held by the Northern Ohio Dental Association.

C. H. CLARK, Secretary,
Youngstown, Ohio.

NEW MEXICO STATE DENTAL SOCIETY.

The next annual meeting of the New Mexico State Dental Society will be held at Albuquerque, June 25th, 26th and 27th, 1917. The following men have been secured for the program: Dr. Dayton D. Campbell, of Kansas City, Mo., on "Prosthesis," Dr. C. C. Allen, of Kansas City, Missouri, on "The Teeth in Superstition and Sorcery;" Dr. I. C. Brownlie, of Denver, Colorado, on "Dental Radiography."

An excellent clinic has been arranged for by members of the New Mexico State Dental Society. The dental Exhibits will be unusually good this year.

Every ethical dentist in the State of New Mexico is invited to attend this meeting.

J. J. CLARKE, Secretary,
Artesia, New Mexico.

THE BOARD OF DENTAL EXAMINERS OF ALABAMA.

The Board of Dental Examiners of Alabama will conduct an examination of applicants, for license to practice dentistry in Alabama, at the Birmingham Dental College, in Birmingham, beginning at ten o'clock Monday morning, June 18th, 1917. All applications accompanied by necessary fee, with proper credentials should be in the hands of the Secretary-Treasurer at least one week before the examinations begin.

For further information, application blanks, etc., address,

H. CLAY HASSEL, Sec.-Treas.,
Tuscaloosa, Alabama.

NEBRASKA BOARD OF DENTAL SECRETARIES.

The Nebraska Board of Dental Secretaries will hold their next regular meeting beginning at noon June 7th to 16th, inclusive, except Sunday.

June 7, 8, 9 practical examination will be given to this year's graduates of Omaha Creighton Dental College and Lincoln Dental College.

All others will begin their examination Monday morning, June 11th, at 8:30 in the state capitol building, Lincoln.

For further information address,

S. A. ALLEN, Sec.-Treas.,
Loup City, Nebraska.

GEORGIA STATE DENTAL SOCIETY.

The 49th Annual Meeting of the Georgia State Dental Society will be held in Brunswick, Georgia, June 14th, 15th and 16th, 1917.

We will endeavor more strenuously each year to make the Ga. Society do a twofold work, first; stimulate every member to the needs of keeping absolutely in step with all proven progressive methods, and remind him of his responsibilities to the public, second; to do thru its district societies and members public educational work so that the public may have a real idea of the value and importance of the mouth from an health economy, and efficiency standpoint, and by so doing to encourage Oral Hygiene work in public schools, and establishment of Free Dental Clinics for children of the worthy poor.

On the 14th inst., at 8:30 p. m., a called meeting of the officers and chairmen of committees was held in Atlanta, Ga., for reports on work already done and consultation over that to be done to make the meeting in Brunswick, Ga., next June a success. I am glad to be able to say the prospects are good for a record breaking meeting. The work is moving nicely under different heads and each man knows what part he is expected to do and will do it. We will have illustrated lectures, etc., both by Ga. men of recognized ability and experts from other sections.

Our clinics will be on a detailed progressive plan thought out especially for our meeting by our most competent chairman of the Clinic Committee.

We hope to have all the district societies in the state in such shape that they can be received into the State Society as component parts. At this meeting we hope to change some of our methods of procedure so as to consume the time in our meetings for real instructions and beneficial discussions.

We will meet at a southern coast city noted for its progressiveness and hospitality, with such well known southern gentlemen as Drs. D. D. and Frank Atkinson, to welcome us to the city famous as a resort, with a most wonderful beach and the best surf bathing, and finest fishing. We are to be treated with beautiful boat trips to the various islands and watering places. All ethical dentists, members of the National Association, and other State Societies are cordially invited to attend.

We want to make this meeting an inspiration that shall be a step towards the next annual meeting which is our semi-centennial jubilee, and will be celebrated in Atlanta with Ex-President of the National Association, Dr. T. P. Hinman, presiding.

A. A. WILLIAMS, JR., Pres.,
Columbus, Georgia.

ARKANSAS EXAMINATION.

The Arkansas State Board of Dental Examiners will hold its annual meeting and an examination at the Marion Hotel in Little Rock, Arkansas, on Thursday, Friday and Saturday, June 21st, 22nd and 23rd.

Applicant for examination must be a graduate of a reputable Dental School. Examination theoretical and practical. Fee and application should be filed as soon as convenient and at least ten days before the examination. For further information address,

DR. I. M. STERNBERG,
Secretary,
Ft. Smith, Ark.

SOUTH DAKOTA STATE BOARD OF DENTAL EXAMINERS

The South Dakota State Board of Dental Examiners will hold its next meeting at Sioux Falls, S. D., July 9, 1917, at nine o'clock a. m. sharp, continuing four days. All applications must be in the hands of the secretary by July 1st.

Fee, $25.00. Address

ROBERT JASMANN, Sec.,
Scotland, South Dakota.

VERMONT STATE DENTAL SOCIETY.

The annual meeting of the Vermont State Dental Society will be held in Rutland, Vermont, May 16th, 17th and 18th. The officers are planning to make this the best meeting ever held in the history of the Vermont State Dental Society.

P. E. MELLEN, Secretary,
Middlebury, Vermont.

ILLINOIS STATE DENTAL SOCIETY.

Quincy, May 8th, 9th, 10th and 11th, 1917.—The Fifty-third Annual Meeting of the Illinois State Dental Society—Preliminary Program.

In presenting a tentative report, your Program Committee is of the opinion that we have been unusually fortunate in securing talent for the Quincy meeting. We are confident that the following subjects are of the greatest importance to the dental profession at the present time, and by attending this session we are sure that the membership will receive the last word on the various topics that will be discussed. The report as completed to date follows:

1. President's Address—Henry L. Whipple, Quincy.

2-9. Committee Reports.

10. Committee on Necrology—Koch Memorial.

11. "What Shall be Done with Pulpless Teeth?"—Thomas L. Gilmer, Chicago.

12. "Oral Anesthesia."—W. C. Marks, Galesburg.

13. "Limitations of Roentgenology in Dentistry."—F. S. O'Hara, Springfield.

14. "Attachments to Vital Teeth for Fixed and Removable Bridge Work."—C. W. Coltrin, Chicago.

15. "The Application of Modern Business Methods to an Ethical Dental Practice."—John L. Kirby, Chicago.

16. "War Films."

17. "Treatment and Filling of Root Canals."—Fred W. Gethro, Chicago.

18. "Dentistry in Our State Institutions."—A. B. Culhane, Rockford.

19. "A Review of the Pathology of the Peridental Membrane."—F. W. Noyes, Chicago.

A list of those who are to discuss the above papers will appear in the next issue of the Bulletin, when the completed program will be presented.

Respectfully submitted,
T. A. BROADBENT,
Program Committee.

TEXAS STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the Texas State Board of Dental Examiners will be held in the Central High School Building, Houston, Texas, beginning Monday morning, June 18th, at 9 o'clock. No diplomas exchanged; no reciprocity.

A fee of $25.00 should be in the hands of the Secretary not later than June 13th. For further particulars and application blank, address,

C. M. McCauley, Secretary,
840 Wilson Bldg.,
Dallas, Texas.

EXAMINATIONS FOR ENTRANCE INTO THE DENTAL CORPS OF THE UNITED STATES NAVY.

W. C. Braisted, Surgeon General, United States Navy, announces that there will be held examinations for entrance into the Navy Dental Corps and Reserve Forces. These examinations will take place in Washington, D. C., April 23rd and June 11th, 1917.

Circulars for the information of persons desiring to enter the Dental Corps of the United States Navy may be secured from the Surgeon General's office of the Navy, Washington, D. C., or from the Secretary of the National Dental Association.

MISSOURI STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the Missouri Dental Board will be held in Jefferson City, June 11, 12, and 13, commencing Monday at 8 A. M.

Applications in hands of the Secretary ten days before examination. For further examination address the Secretary. V. R. McCUE, Secretary,
Cameron, Mo.

MASSACHUSETTS BOARD OF EXAMINERS.

A meeting of the Massachusetts Board of Dental Examiners, for the examination of candidates, will be held in Boston, Mass., June 22 to 30, 1917, inclusive. All applications must be in the hands of the Secretary on or before June 12th. For further information address
GEORGE H. PAYNE, Sec.,
29 Commonwealth Ave., Boston, Mass.

IOWA STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the Iowa State Board of Dental Examiners, for the examination of candidates, will be held at Iowa City, Iowa, commencing Monday, June 4th, 1917, at 9:00 a. m.

For further information and application blanks address the Secretary,
DR. J. A. WEST,
417 Utica Bldg., Des Moines, Iowa.

ANNUAL HOME CLINIC OF THE NORTHWESTERN UNIVERSITY DENTAL SCHOOL.

The Annual Home-Coming Clinic of the Northwestern Dental Alumni Association will be held June 11th and 12th, 1917. Two days will be devoted to this function. It is proposed to make it larger, more entertaining and more instructive than heretofore.

Dr. J. P. Smith, of Chicago, will arrange for the first day to be occupied with papers, demonstrations, and discussions, dealing with the basic and the new in the practice of modern dentistry.

On the second day table and chair clinics will be held. No feature of dental discussion has contributed more to spread thruout the mass of the profession new ideas and refinement of technic than has the table clinic. What is old to one is new to another. You are respectfully urged to take part in the second day's program. M. M. POSTLE,
31 West Lake St., Chicago, Ill.

NORTHWESTERN UNIVERSITY DENTAL SCHOOL ALUMNI ASSOCIATION.

Annual Home-coming Clinic, 31 W. Lake St., Chicago, June 11th and 12th. Good program for each day. All alumni urged to attend this, the best meeting in the history of the organization.

M. M. PRINTZ, Sec'y. Alumni Ass'n.,
4235 Lake Park Ave., Chicago.

KENTUCKY STATE DENTAL SOCIETY.

The next annual meeting of the Kentucky State Dental Association will be held at Louisville the three days previous to the Kentucky Derby—May 9, 10, 11, 1917. Address all correspondence to the Secretary.

W. M. RANDALL, Secretary,
1035 Second Street. Louisville, Kentucky.

MONTANA STATE BOARD OF DENTAL EXAMINERS.

The Montana State Board of Dental Examiners will hold their next session for examination on July 9th, 10th, 11th, 12th and 13th, in Helena, Montana. Applications must be in the hands of the Secretary ten days before the 1st of July.

For information inquire of
DR. G. A. CHEVIGNY, Secretary,
107 Clark Block, Butte, Montana.

TENNESSEE STATE DENTAL SOCIETY.

The Golden Jubilee of the Tennessee Dental Society will be held in Memphis, June 19, 20, 21, 22. The officers promise the most attractive program ever presented in the South. Social features will be prominent. All ethical dentists invited—come and bring your wives.

D. M. CATTELL, President.
C. E. HINES, Secretary.

SOUTH CAROLINA STATE DENTAL SOCIETY.

The forty-seventh annual meeting of the South Carolina State Dental Association will be held in Columbia, S. C., at the Jefferson Hotel, commencing May 8th, 1917.

ERNEST C. DYE, Secretary,
Greenville, S. C.

STATE OF OKLAHOMA BOARD OF DENTAL EXAMINERS.

The next regular semi-annual meeting of the Oklahoma Board of Dental Examiners will be held in Oklahoma City, Oklahoma, Skirvin Hotel, beginning June 25th. Graduates of reputable colleges presenting fifteen units credit in literary work only eligible to take examination. For information write

DR. H. OVERBEY, Secretary,
Ryan, Oklahoma.

CONNECTICUT STATE DENTAL ASSOCIATION.

The fifty-third annual meeting of the Connecticut State Dental Association will be held at the Hotel Griswold, New London, Connecticut, June 14th, 15th and 16th, 1917.

We extend a cordial invitation to all members of the National Dental Association.

GEO. S. B. LEONARD, Secretary,
Mystic, Conn.

NORTH CAROLINA DENTAL SOCIETY

The North Carolina Dental Society will hold its forty-third annual meeting at Durham, N. C., June 27, 28 and 29, 1917.

R. M. SQUIRES, Sec'y.,
Wake Forest, N. C.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The next meeting of the National Association of Dental Examiners will be held October 22nd and 23rd, 1917, at Hotel Astor, New York City.

J. A. WEST, Secretary,
Des Moines, Iowa.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The National Association of Dental Faculties will hold its meeting on Friday and Saturday, October 19th and 20th, at the Hotel Astor, New York City.

The Executive Committee to meet at 9 A. M. and General Sessions at 10 A. M. on Friday.

B. HOLLY SMITH, Chairman.
405 N. Charles St., Baltimore, Md.

AMERICAN MEDICAL ASSOCIATION CLINICAL CONGRESS, JUNE 4, 5.

The American Medical Association will hold its annual meeting in New York City, June 4 to 8. In all probability this is to be the greatest meeting of medical men ever held in this country. The Committee on Arrangements consists of Drs. Wendell C. Phillips, Floyd M. Crandall and Alexander Lambert. Headquarters have been established at 17 West 43rd Street, N. Y. City, to which all communications should be addressed. Monday and Tuesday, June 4th and 5th, will be devoted to a Clinical Congress, in which all departments of medicine will be represented, each department to have its own series

of clinics, occurring in different parts of the city.

The following is a list of chairmen of departmental committees: General Medicine, Samuel W. Lambert; Pharmacology and Therapeutics, Frank S. Meara; Pathology and Physiology (A) Clinical and Medico-Legal, Otto H. Schultz; (B) Laboratory (Diagnostic) Frederic E. Sondern; (C) Cancer Research, Francis C. Wood; Preventive Medicine and Public Health, H. M. Biggs; (A) State, Linsly R. Williams; (B) Municipal, Haven Emerson; Pediatrics, Rowland G. Freeman; Dermatology, Howard Fox; Neurology, Edward D. Fisher; Mental Diseases, Carlos McDonald; General Surgery, Charles N. Dowd; Orthopedic Surgery, Virgil P. Gibney; Gynecology, George G. Ward, Jr. Obstetrics, Edwin B. Cragin; Urology, Edward L. Keyes, Jr.; Rectum and Colon, Jerome M. Lynch; Ophthalmology, John E. Weeks; Otology, Edward B. Dench; Rhinology and Laryngology, Lewis A. Coffin; Stomatology, W. B. Dunning; Roentgenology, Lewis G. Cole; Anesthetics, James T. Gwathmey; Women Physicians, Mathilda K. Wallin; Brooklyn Representatives: John C. MacEvitt, William F. Campbell, Joshua M. Van Cott, Paul M. Pilcher, Albert M. Judd; Allied Topics: Trained Nursing and Training Schools, Miss Adelaide Nutting; District Nursing System, Miss Lillian D. Wald; Hospital Social Service, Mr. James K. Paulding; Planning and Financing of Municipal and Non-Municipal Hospitals, Sigismund S. Goldwater; Hospital Superintendents and Executives, Robert J. Wilson; Military Surgery and Red Cross, Samuel Lloyd.

The great number of clinics, their scope and scientific value, will be unprecedented. The program is in active preparation, soon to appear in full in the Journal of the A. M. A.

Between seven and ten thousand physicians are expected to attend this Congress and it is hoped that dental practitioners thruout the country will avail of this opportunity to become Associate Fellows of the Section on Stomatology and thus be entitled to attend these clinics as well as the regular meeting of the Association on June 6-8. The following is quoted from a letter from the General Secretary:

Dentists holding the degree of D. D. S. who are members of state or local dental societies and who are not eligible to regular membership, may be elected to Associate Fellowship by the House of Delegates of the American Medical Association when a formal application for such Associate Fellowship has been approved by the Section on Stomatology. In other words, when a dentist holding the required degree makes formal application for Associate Fellowship, accompanying this application with a certificate from the secretary of his state or local dental society, which certificate certifies to his being a member in good standing in that body, this application and the attached certificate is forwarded to the secretary of the Section on Stomatology for the approval of that Section. The application is then in form for presentation to the House of Delegates for the election or rejection of the applicant.

We will be glad to transmit any such applications, or they may be sent direct to the secretary of the Section on Stomatology, Dr. Eugene S. Talbot, 31 North State St., Chicago.

Headquarters of the Section on Stomatology will be at the Hotel Astor, Broadway and 45th St.

No more impressive opportunity for the fraternization of dental and medical men has ever been presented in the history of the profession. Every dentist who reads this announcement should enroll immediately in the Section on Stomatology (annual dues $5, which entitles him to the Weekly Journal of the A. M. A.), and thus place himself in direct touch with the greatest happenings in medical science.

HENRY W. GILLETT,
ARTHUR L. SWIFT,
WILLIAM D. TRACY,
HENRY S. DUNNING,
ARTHUR H. MERRITT,
WILLIAM B. DUNNING, Chairman,
Clinical Com., Sec. on Stomatology, 140 West 57th St., N. Y. City.

FILLING ROOM.

KOLYNOS

Veiled in Mystery are the factory processes used in producing many of the preparations offered to the dental profession for recommendation to their patients.

Not so with Kolynos. A visitors' gallery is here provided for the convenience of yourself and patients where a cordial welcome awaits you.

Dentists visiting New Haven are earnestly invited to call to inspect the plant and the various steps in the manufacture of Kolynos.

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